NEWS IN PERSPECTIVE

ECONOMIC CLIMATE

LITTLE CHANGE, up or down, can be seen in the business outlook as the year nears its mid-point. Demand for goods and services will stay high, and enough is being produced to keep prices from running away. Costs of foodstuffs, which have lagged for a long time, probably will catch up a bit. On the whole, however, a gentle rise is in prospect for several months.

MAJOR INFLUENCES on the course of the economy hold out the following prospects: Compared to the first quarter of this year, inventory-building will contribute little, if anything, to economic growth. In fact, inventories are likely to diminish during most of the rest of the year whereas they were accumulated at an annual rate exceeding $10 billion during the first quarter. A significant rise in consumer spending appears in the making, continuing the trend that has been visible for some time. Construction will rise a bit, but it is best not to count too heavily on it as a further stimulant. Plant and equipment spending, for example, has already virtually reached the annual rate of expenditure anticipated for the entire year. Government outlays—always an important influence—far exceeded receipts in the second half of 1959. This year, government infusions of money into the economic stream will be smaller by several billions.

MANAGEMENT VIEW

TELLING UTILITY SHAREHOLDERS what makes their companies outstanding, with increasing effectiveness, power company officials probably take better advantage of annual meeting occasions for good PR planning than do most U. S. corporate officials. From the heavy run of such shareholder sessions in recent weeks, here are a few examples of such presentation planning:

UTAH P. & L. CO. took quick advantage of a recent change in the law in the state of Maine (in which the utility is incorporated), held its annual meeting in its headquarters state for the first time, drew the largest attendance ever (several hundred) to the Salt Lake City gathering. Best endorsement of the job this utility is doing was in the form of a completely amicable meeting, spiced only with "evocative" praise for management, headed by Pres. E. M. Naughton.

MIDDLE SOUTH UTILITIES, INC. for the first time called shareholders to Mississippi (Jackson) where Pres. E. H. Dixon praised Mississippians for adopting the "forward-looking attitude" . . . responsible for attracting industry into the South . . . and being the first state with a comprehensive program with this aim.

WASHINGTON WATER POWER CO. took occasion to stress "expanded services" in its plans, including the provision of domestic water systems in addition to electric and gas. Leaving operations direction to newly elected Pres. Geo. M. Brunzell, Chairman Kinsey M. Robinson revealed intentions of devoting more time to some of the industry's "broader problems."

IMPROVING MANAGEMENT and operating practices is the aim of a continuing program in the New England Electric System, but as Pres. Wm. Webster noted for shareholders recently, the program's target of increasing efficiency in the use of manpower is considered a prime weapon against the eroding effects of inflation. High priority in future planning is given to continuance of the utility's student training program, in which 150 college graduates have already been prepared for management responsibility in system companies.

BEST WORD "IMAGE" to represent "non-government" power companies, a new Central Surveys check shows, is conveyed by

South Utilities) is opposed by SEC staff, because "exercise price is fixed at a price completely unrelated to market price of stock at the time option is exercised."

SO. CALIF. EDISON PETITION for a re-hearing on treatment of liberalized depreciation has been denied by the California Commission, upholding a previous ruling.

INDUSTRY AWARD WINNERS--American Elect. Power's Pres. Philip Sporn, recipient of the annual Conservation Service Award of the U.S. Interior Dept., "in recognition of valuable services rendered as a proponent of fuel conservation in the U.S."; Ebasco Services Inc., recipient of a citation of the Florida Industrial Commission for outstanding achievement in industrial safety in 1959; NRECA, cited by the Chicago Federated Adv. Club for the best corporate image campaign in consumer magazines (an institutional advertising program inaugurated to commemorate REA's 25th anniversary).

BETTER STREET LIGHTING campaign is being built around an article in the June issue of "Reader's Digest" entitled "To Make Streets Safer After Dark." Suggests the article, "Most power companies will gladly survey neighborhood or community needs, furnish cost estimates, suggest long-range goals or programs."

SUSPENSION INSULATOR FILM, Ohio Brass Company's "The Second 50-Million," reviews major technological advances in the development of this kind of high-voltage insulation. (The 25-minute color film can be obtained through local O-B representatives.)

THERMO-NUCLEAR RESEARCH program is extended four more years, Texas A-Energy Research Foundation has announced.

LOOKING AHEAD... FINANCIALLY

--From Irving Trust

NEW MONEY FINANCING of $140,272,000 is the second lowest total in past eight months. Electric financing of $78,709,000 (56-percent of total) is lowest in over two years.

One "AA" issue sold in May--$12,000,000 of Pennsylvania Electric to yield 4.88-percent (no refunding protection). Syndicate was dissolved on the 18th with approximately 50-percent of the issue still unsold. (Latest bid price is 100.875, yielding 4.94-percent.)

Two "A" issues were offered, neither with refunding protection. On the 13th, $12,000,000 of California Electric Power, yielding 5.10-percent Syndicate dissolved on the 24th with approximately 1/3 of the issue unsold. Bid price is now 99.375, to yield 5.17-percent. On the 25th, $10,000,000 of Jersey Central Power & Light at a yield of 5.20-percent. Less than 10-percent of the issue is unsold.

No preferred issues were offered, except for one private deal.

Three issues of common were offered. The largest was the $1,000,000 direct offering of Columbia Gas on the 4th, which was well received. On the 31st, $23,000,000 of Florida Power & Light were bid on, with the offering on the 1st of June. Arizona Public Service offered stockholders $12,000,000 of common, with rights expiring on 6/14.

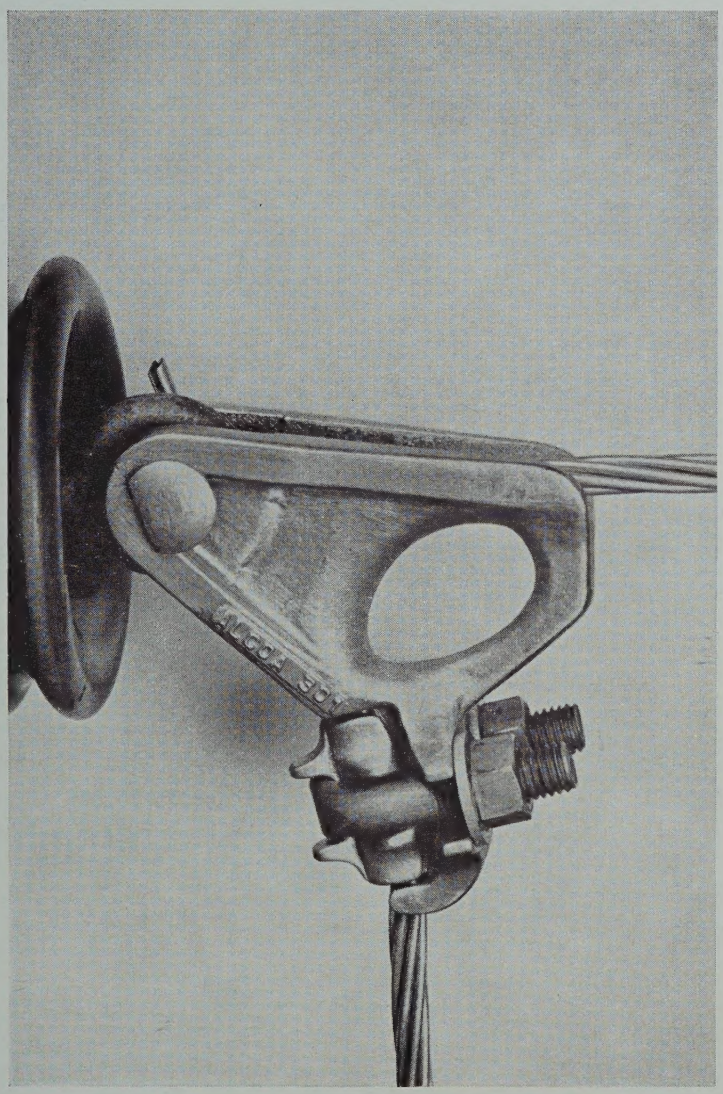
THE IRVING TRUST INDEXES SHOW:

Bond Averages	April 30, 1960 % Yield to Maturity	May 31, 1960 % Yield to Maturity
"AAA"	4.55	4.59
"AA"	4.56	4.61
"A"	4.73	4.88

Stock Averages	Preferred--$ Yield		Common-$ Yield		Price/Earnings Ratio	
	4/30/60	5/31/60	4/30/60	5/31/60	4/30/60	5/31/60
	4.91	4.90	4.23	3.97	17.4	17.4
	4.93	5.01	4.41	4.05	17.6	18.2
	5.06	5.11	4.23	4.22	16.3	16.1

ALCOA ALUMINUM

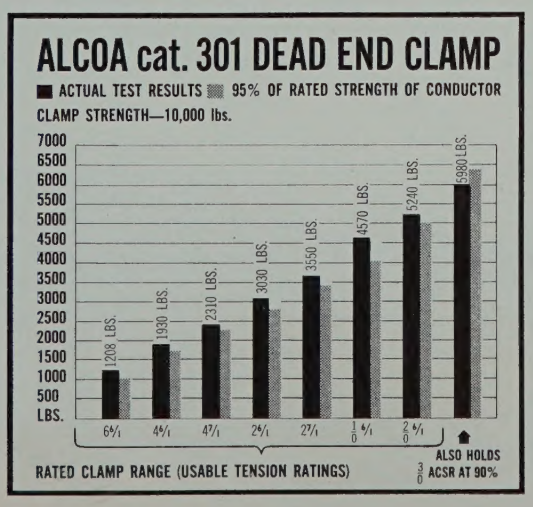
ACCESSORIES ROUNDUP



Very new dead-end clamp

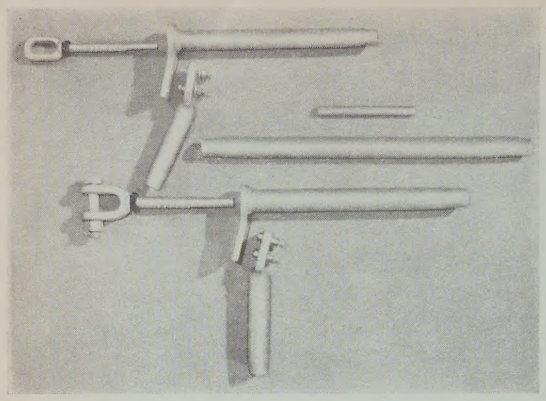
We say "very" new to emphasize the importance (to you) of this clamp. It's designated 301 in our catalog. But that doesn't begin to tell you of its many advantages. Possibly the first thing you will notice is the ½-inch aluminum U bolt. That's right —½-inch high-strength aluminum alloy with Alumilite 205 finish and grease film. And the clamp itself? It's compact, cast in one piece of a high-quality aluminum alloy noted for its corrosion resistance. The large pulling eye is an integral part of the structure of the clamp. Makes it easy to use the hoist hook. What about holding power? This full-tension clamp will hold 95% of the rated strength of the conductors for sizes No. 6 to 2/0 ACSR. The bar chart appearing below gives you the full story.

You'll appreciate, too, how easy this new Cat. 301 dead-end clamp is to thread. No kinking or twisting, because that long bolt gives you plenty of freedom. We've also paid attention to details—Alclad washers, the sheared clevis pin for hot stick use, aluminum cotter pin, and such. The biggest news of all may well be price. We'd be happy to discuss it (and all the reasons why the Cat. 301 is such a value) with you.



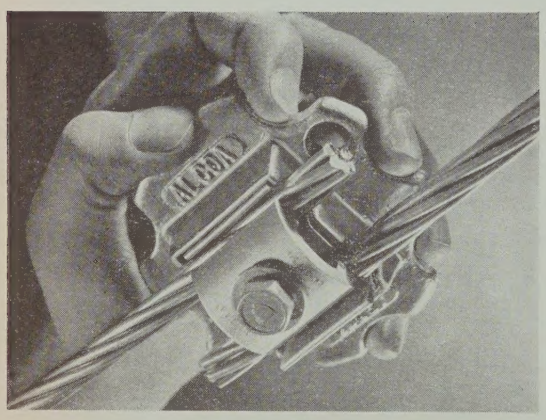
The question of clamp ratings

How do you rate a clamp? If the figure you've been accustomed to receiving represents the rating of the clamp itself before it breaks, have another go at it. What really counts, as you well know, is the holding power on the conductor—not the tension required to pull the clamp apart. Consequently, we always refer to how the clamp holds the conductor as the usable tension rating. So we provide you with the usable ratings for Alcoa clamps. Makes sense, doesn't it?



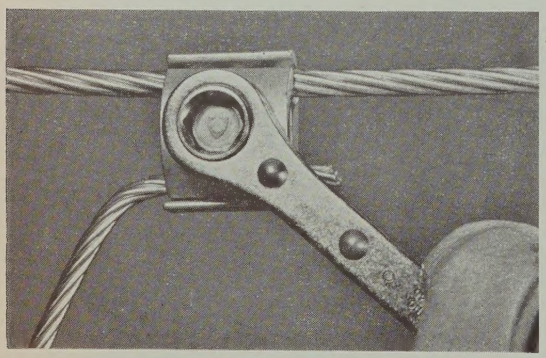
What to look for in tubular line accessories

Take a look at the picture. These tubular accessories you will find easy to handle and install. Spacing of bolt holes of dead-end tongues is standardized so you can fit any terminals to any dead-end body. Where desired, the tongue can be positioned radially about the axis of the conductor before compression. Note, too, that the 15° angles on dead-end tongues and terminals means you can place the jumper loop in either perpendicular or 30° position with the same accessories. Every item is marked with catalog identification, dies required, and position for compression. Conductor goes in easily. Available for use with standard conductors up to 1,590,000 CM, as well as many of the "special" and large-diameter conductors for extra-high-voltage applications.



No more kinking

Why didn't someone think of this before? Deceptively simple in appearance, this wheel-like device holds small parallel-groove clamps, so you can apply torque to the bolt without kinking the wire. In fact, the holder wheel holds two clamps—the Cat. 490.0 for #6-#2 AWG on one side, and the Cat. 396.6 for #6-2/0 ACSR on the other. The grooves on the periphery of the wheel give you a good grip when wearing gloves. What it adds up to is no kinking—a big difference in the appearance of your service lines. Made from aluminum (of course!), the wheel is priced at just $1.00. How many can you use?



How tight is right?

Nobody will argue that bolts must be tight. But how tight? Because they are greased and have smooth surfaces, Alcoa aluminum bolts for accessories develop high tensions at relatively low twisting forces. So, putting the right pressure on—without using an expensive torque wrench—requires skill. How to do it easily by measuring rotation of the bolt in small pg clamps is spelled out in an illustrated bulletin. Send for a copy.

ROME CABLE DIVISION OF ALCOA
Rome, New York

Please send me the items checked below:

- ☐ Data on Cat. 301 dead-end clamp
- ☐ Tubular compression accessories catalog
- ☐ Information on ordering the new Alcoa holder wheel
- ☐ "How tight is right" bulletin

Name .....

Title .....

Company .....

Address .....

ROME CABLE
DIVISION OF **ALCOA**

That Effort Pays Off When

Communities Salute Utility Leadership

New recognition comes regularly to electric utilities for their exemplary efforts in providing the vital leadership needed by communities to maintain and expand their economic well-being. In April, for example, such awards went to the Philadelphia Electric Co. and to Virginia Electric Power Co.

In Philadelphia, it was a "first annual" award—by the Poor Richard Club, a "Selling Philadelphia" citation.

The presentation was given for "effectively telling the Philadelphia story to the nation and the world through modern advertising and promotion methods." At the presentation ceremonies, James H. J. Tate, president of Philadelphia City Council, said that the award was a "richly deserved one for this great Philadelphia utility, which was a pioneer in the use of an important part of its advertising budget to promote the advantages of our City.

In accepting the award, Geo. R. Conover, vice-president in charge of personnel and public relations, said, "We started our campaign in 1951 to sell the Port of Philadelphia and the area it serves because we had full confidence in the belief that Delaware Valley had a rich growth potential. Twenty-one million people live within a 100-mile radius of this city, providing the greatest market for finished goods to be found anywhere."

The Governors of Virginia and North Carolina joined with State industrial and banking leaders to pay tribute to Virginia Electric and Power Company as that organization received The Bank of Virginia's 1960 citation in its annual Salute-to-Virginia Industry.

Herbert C. Moseley, bank president, presented a bronze plaque to VEPCO president A. H. McDowell, Jr. "in recognition of outstanding industrial enterprise and significant contribution to the economic progress of the Commonwealth."

Geo. R. Conover, vice-president of Philadelphia Elect. Co., accepts Poor Richard Club's first annual "Selling Philadelphia" award from Club president—a bronze bust of Benjamin Franklin.

Virginia's Governor J. Lindsay Almond, Jr. told the dinner gathering at the Commonwealth Club in Richmond that "VEPCO has built soundly and rapidly in the application of foresight, business acumen and faith in the future and is contributing substantially to the economy of Virginia, North Carolina and West Virginia."

In accepting the plaque on behalf of VEPCO employees, Mr. McDowell said, "We who are charged with the responsibility of managing VEPCO have as our basic company policy a philosophy of dedicated service to all of that vast area in which we are privileged to operate.

"We are dedicated to the principle of being a good citizen in the communities where we live and work. The interests of those communities are our interest, and it is our wish to see them grow and prosper.

"As we look back over those years, we like to feel that we have been a good steward of the public trust and confidence—that we have been a good friend and neighbor—and that we have helped to improve the economic stability of the community."

West Coast Survey Finds

Best Sales Spur: Compensation Plan

Over half of 14 electric utilities in the West give monetary awards or equivalent awards for prospect-finding by non-sales employees, while over one-third give awards or certificates of merit for sales accomplishments. Almost one-third pay bonuses and commissions. These results from a recent survey were reported to the Business Development Division of NELPA by J. M. Mead, vice-president of So. Calif. Edison Co.

In response to the formal questionnaire, the utilities rated the best sales incentive and/or motivations in this order: (1) compensation plans, (2) upgrade or promotion of employee, (3) sales contests, (4) sales meetings, (5) sales bulletins, (6) personal correspondence, and (7) "quota clubs."

In presenting this survey summary to the annual conference of the NELPA group, Mr. Mead observed:

"The motivation of salesmen is a key problem in every sales organization and is particularly difficult in an electric utility. It becomes even more complex with a non-merchandising utility, which must depend upon others to sell the equipment which uses more kilowatt hours."

PRIVATE POWER'S ROLE seems to have been settled amicably by the AEC and the JCAE (of Congress), at least for this session. AEC Chief McCone seemed to satisfy the Congressmen that private effort is making progress, with a "satisfactory" report on the California utilities' plans for building 300,000-kw reactors; and in turn, the Joint Committee agreed to get $25-million for the AEC to build a prototype organic-moderated reactor, if private industry does not come through. (Another $15-million is available for R&D for unsolicited or third round proposals.)

MERCHANT SHIP PROPULSION is not expected to utilize nuclear power on a competitive basis for another 5 to 10 years, a recent Atomic Industrial Forum-sponsored conference was told. Yet, conferees heard that this means of propulsion holds the most promise for the technological demands of future shipping.

CO-OP AND MUNICIPAL BIDS to operate a 22,000-kw pressurized water reactor using superheat were rejected by the AEC. However, two—Jamestown, N. Y., and a co-op in La Crosse, Wis.—have additional time to propose alternate sites, since the initial proposals were unsatisfactory.

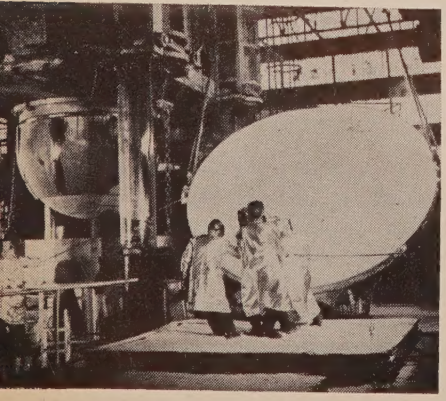
CRITICAL OF LICENSING RED-TAPE, though, Commonwealth Edison has told the AEC that the agency's administrative procedure is "so cumbersome it may very well become a serious deterrent to expanded industrial participation in the atomic power program." The utility suggests: (1) elimination of intermediate decisions in some cases, (2) limitation of the role played by the Reactor Safeguards Committee, (3) more flexibility for a licensee to alter reactor design.

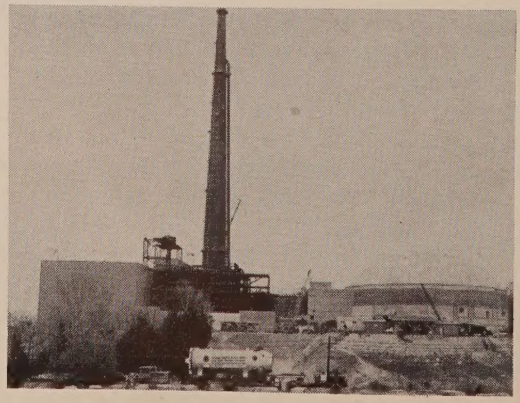
AREA POPULATION DENSITY is a new factor considered in the formula for computing the amount of financial protection for power and testing reactors. Greater weight is given to population close to the reactor, in one of several new amendments included with the AEC's recently issued "final" indemnity regulations. Reactors with a rated capacity of 100-mwe or more will find financial protection of $60-million, the maximum amount available from the insurance industry. Another amendment requires that construction permittees have financial protection of $1-million, if they possess and store at the site fissionable material for later fuel use.

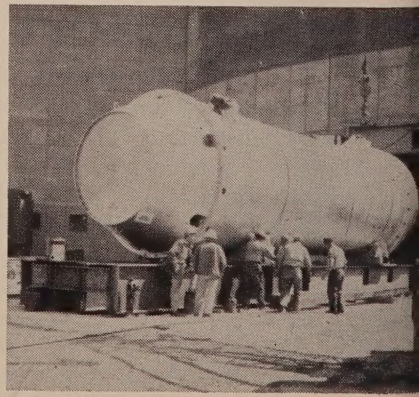
SOLE POWER FOR WASTE DISPOSAL belongs to the AEC, the California Superior Court decided recently, ruling against the city of Long Beach, which sought to regulate the operations of the Coastwise Marine Disposal Corp. The judges ruled that local authorities could regulate AEC licensees only insofar as they did not "unreasonably" interfere with AEC jurisdiction.

SITE SELECTION CRITERIA should be put into writing as a guide for reactor designers and a standard of acceptance for those reviewing a reactor's safety characteristics, the AEC's reactor safeguards committee chairman advised a Joint Congressional Committee hearing recently. According to Leslie Silverman, a good place to start would be boiling and pressurized water reactors for power production.

IN OTHER AEC ACTIONS, the number of categories in which classified technical information is made available to Access Permit Holders has been reduced to two: Nuclear Technology (C-44) and Plutonium Production (C-65); and a revised notice has been issued regarding charges, specifications and packaging information for uranium hexafluoride.







Indian Point's huge (35-foot, 230-ton) pressure vessel started as a steel slab, formed by Babcock & Wilcox at a single stroke on giant hydraulic press to make a finished head (left). With plant in background, reactor pressure vessel (foreground, center photo) nears destination. And, at right, vessel moves into location inside 160-ft diameter containment sphere.

Washington Water Power Co. to Increase Rates Under Washington PSC Order

The Company's original request was for an increase in rates in the amount of $2,249,000. Instead the PSC granted $1,611,000, or 72% of the amount originally asked for. It is of interest to note that the Company also received an increase in the Idaho jurisdiction in the amount of $830,000, or 90% of the amount asked for originally.

Rate Base Determination

The Commission seemingly went out of its way not only to belittle the credibility of the Company's witness who testified on trended original cost, but also to destroy the whole validity and justification of the fair value rate base concept. Here is what the PSC had to say in quoting approvingly its own witness:

> ". . . the use of present value determined under the trended original cost method, is cumbersome, time consuming, expensive, difficult to check as to accuracy, and soon obsolete; that utilities operating in the three states of Washington, Oregon and California, where the prudent investment (original cost) method is used, have succeeded in attracting hundreds of millions of dollars of capital, both debt and common equity; that so far as the investor in utility securities is concerned, he is looking primarily for stability of income and and protection of his investment, and neither should be influenced by fluctuations in price of commodities or changes in construction costs; that if the rates of the company were to be fixed on the basis of a trended original cost rate base, the preferred stockholders, bond holders, and note holders, would gain no greater compensation to offset the decline in the purchasing power of the dollar than if an original cost rate base were used, as all the additional return would flow to the common stockholders."

The above argument is of course an interesting example of regulatory "double talk" in order to arrive at an already predetermined result—namely the use of an original cost rate base.

Furthermore, the statement by the Commission that trended original cost becomes "soon obsolete" is really amusing. If trended original cost is obsolete, then surely original cost must be completely antiquated.

A good example of erroneous thinking in this connection is the Commission's statement that:

> "It may be noted that the higher price levels of commodities and labor of the so-called 'inflation period' are to a large extent reflected in respondent's original cost records since approximately 46 percent of its electric plant has been constructed since 1953."

In the same period, the Handy Whitman Construction Cost Index for hydro properties increased 33%, and hence even in this short period of time there was a substantial erosion of property.

As to the attraction of capital theory under the original cost concept, this merely means that the existing stockholders are being "plowed under," and that there is in effect a transfer of values from the original group to the new group of owners of the property, since, as the Commission itself admits, the incoming equity stockholder protects himself by "requiring a higher cost of capital." As to the Commission's solicitous concern for the bond holder and the preferred stockholder, that they will not get the benefits of trended original cost, it should be kept in mind that the senior security holders merely lend the money, and that the gains and losses rightfully belong to the owners of the property.

The Commission granted the Company an average net electric plant in service for the period ending June 30, 1961, and while disallowing any working capital, it did include net electric plant acquisition adjustments.

Rate of Return

The staff witness recommended that the rate of return be 5.75% if the deferred surplus is included in the rate base, or 6% if it were excluded. The PSC by allowing a return close to 5.9% partly disregarded the advice of its witness. The Company's witness had asked for a return ranging from 6.25% to 6.4%.

However, the PSC discussion of the general problem of rate of return is of interest. It said in part:

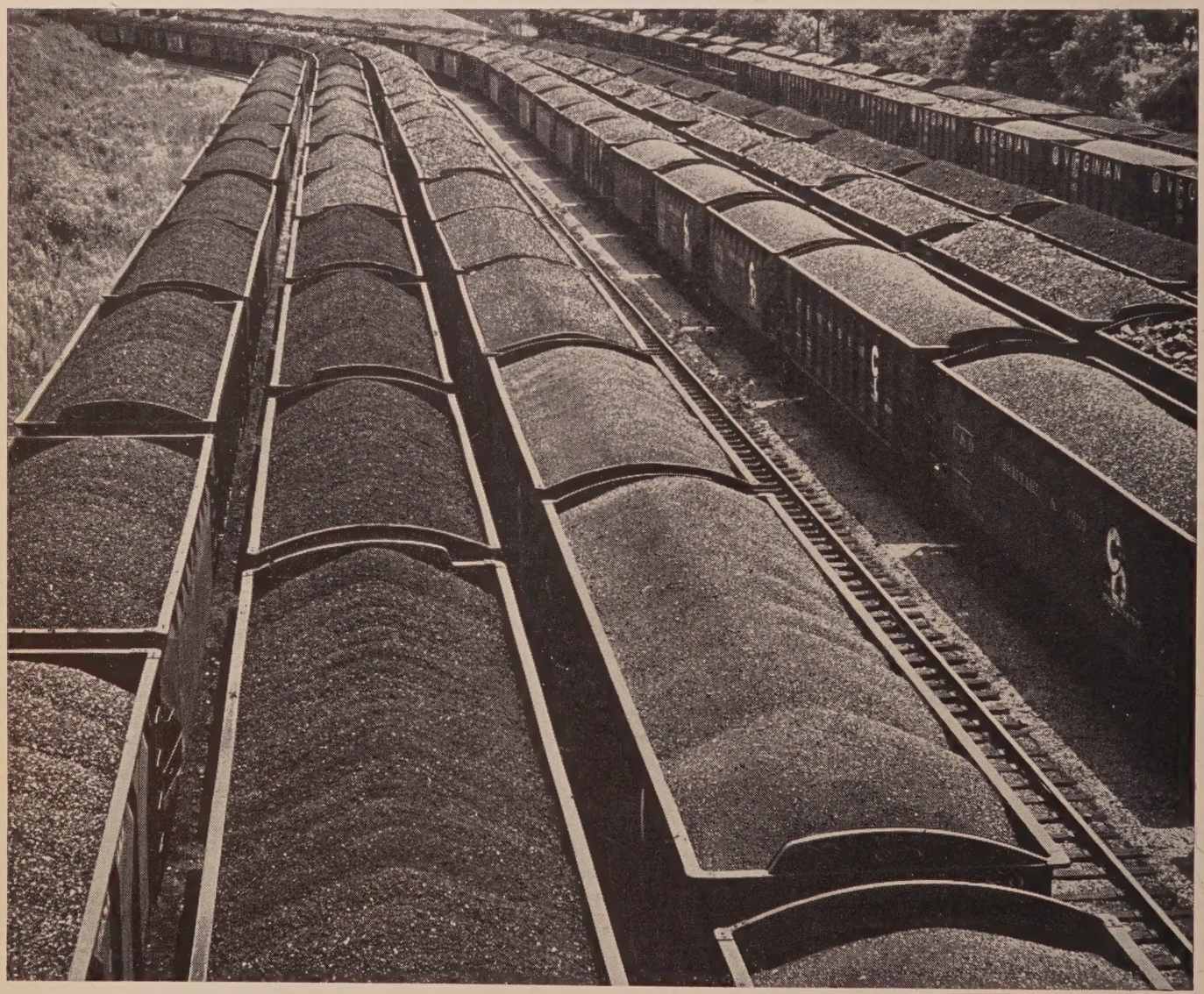
> "There is no doubt that we have had inflation and there is not much doubt but that we will have more of it. This does not, ispo facto, require or dictate the use of a current value rate base. As we shall discuss later, investors in utilities regulated on an original cost type of rate base protect themselves against and obtain compenstation for the lack of an inflation hedge by requiring a higher cost of capital. Therefore, to use also a fair value rate base, with a rate of return derived from the appraisal of securities of utilities in original cost jurisdictions, would be to allow dupli-

(Continued on page 78)

short term vs. the long look

No utility is about to lose interest in the invoice price of coal. But as the power needs . . . and the resulting coal needs for the next ten and twenty years shape up in every operating area . . . short term thinking is giving way, more and more, to the *long look.*

Utility engineers and purchasing agents are asking themselves and their coal suppliers some pointed questions: "Can we count on these suppliers to deliver the kind and quantity of coal we're going to need in the years ahead? Have they adequate reserves? Is this coal costing us over and above its invoice price in excessive coal handling, ash handling, equipment outages, freight charges on inerts? Or is it coal that eliminates these frequently overlooked incremental costs, delivers highest operating efficiency and steam at the lowest cost?" The answers you'll get to such questions from Island Creek are the kind that let you plan ahead with confidence. Our engineers would welcome a chance to sit down with yours for a thoroughgoing discussion. Write, wire or phone.



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by RALPH ELLIOTT
Washington Editor

Misplaced Guilt

So much furor and distortion were manufactured from the flimsy raw materials of the House Legislative Oversight Subcommittee's investigation last month of the conduct of Federal Power Commissioners, that it seems high time the matter be put into something approaching a reasonably accurate perspective.

Under ordinary circumstances, the matters gone into could easily have been disposed of, with little fanfare, in two or three days of hearings—instead of the eleven days over which the probe was stretched. It just happened that the central issue involved a front-page personality, making it a "natural" for the inordinate build-up of impending expose that continued in the press for several weeks prior to the hearings. The result was that an overriding guilt-by-inference atmosphere largely obscured the import of the factual showing that was made.

Actually, the affair goes back to last November, when an oil trade journal of relatively small circulation came up with a scoop. The article declared that in a case decided by FPC a few days earlier involving Midwestern Gas Transmission Co.'s application to pipe gas from Canada to the upper midwest, the Commission, as a result of pressure applied ex parte by the company's counsel, overruled its staff's recommendation as to rate of return and allowed a higher rate. Surprisingly, the daily press did not follow up on the story.

Then on March 23, during House Interstate Commerce Committee hearings on pending bills to establish a code of ethics for regulatory agencies, the ex parte phase of the Midwestern case burst into the open. FPC Chairman Kuykendall readily acknowledged that a company representative (he did not name the man) had talked privately with him and with Commissioners Kline and Connole about the case. But he insisted that the merits were not discussed at all.

The press, once scooped in the area, took it from there with a vengeance. This was no ordinary backdoor influence matter. The company lawyer was front page copy and to boot had an eye-catching nickname. Dispatches "revealed" that the lawyer was none other than Thomas G. Corcoran, one-time New Deal braintruster and close confidant of President Roosevelt, who had knighted him Tommy the Cork. (The original oil journal story had named Corcoran as the contact man.) Within a few days the Midwestern matter had been ballooned into ludicrous proportions. Corcoran's visits were credited with having pressured FPC into "reversing itself," "by-passing its staff," "gouging the consumers," etc.

Finding himself with a hot potato, committee chairman Oren Harris, who also heads the Oversight Subcommittee, turned the affair over to the latter group for investigation and hearings. The subcommittee, it will be recalled, has been conducting a slow-moving program to determine what can be done legislatively to solve a wide range of administrative process problems as a means of increasing the effectiveness and operating efficiency of federal regulatory agencies. Unfortunately, the program was launched in an atmosphere of scandal brought on by disclosure that backdoor influence was the decisive factor in the Federal Communications Commission award of a broadcasting license to one of two competing applicants. The general and erroneous impression was created, and still widely lingers, that the subcommittee is the group called on when there is scandalous regulatory conduct to be dug into and exposed.

And while the subcommittee investigators were fine-tooth-combing Commission records and the Commissioners' personal files, reporters did their own digging and came up with various suspicion-arousing (but immaterial) tidbits—such as disclosing that Commissioners on a couple of occasions accepted transportation in airplanes owned by companies they regulate.

Washington had seldom witnessed a more unsparingly publicized prelude. By the time the hearings commenced on May 10, the foregone conclusion had been well developed in the public mind that FPC was to be laid open as a body more attuned to ex parte pleaders than to official case records or its staff's expert advice.

But what happened during the 11-day "trial" was something far different. Before it was over, Congress was being effectively fingered as possibly the real villain.

Boiled down, the testimony showed that what happened in the Midwestern case was this: The company had contended the proposed project would need a 7-percent rate of return to make it financially feasible. The staff urged a 6¼ percent ceiling. The Commission was deadlocked over the issue. At the time of Corcoran's visits the Midwestern proposal had been pending nearly four years, and less than a week remained to meet a deadline in the Canadian gas supply contract. No competing applicant was involved. Either a failure to meet the deadline or the imposition of the staff-proposed ceiling as a condition in the certificate would have aborted the project.

Corcoran insisted he was merely "urging avoidance of an unnecessary procedural lapse." There was no changing of minds. The unanimous decision granting the certificate—issued the day before the contract deadline—simply deferred a

(Continued on next page)

WASHINGTON *from page 77*

determination of the rate of return.

Corcoran's statement that his visits violated no existing laws, rules or regulations went unchallenged. What's more, he pointed out, the FPC staff have full ex parte access to Commissioners and often take positions against applicants.

In a sharply accusing tone he reminded the subcommittee that if Congress would provide its regulatory creature with the wherewithal to operate efficiently and clear up its heavy backlog of cases, then it wouldn't be necessary for vitally affected parties to take the course he took.

In summary, the hearings pointed up some instances of what might be termed indiscretions, but revealed no lawbreaking or serious wrongdoing. But regrettably in cases like this, no amount of factual evidence ever seems to erase the guilt stain created by pre-hearing headlines.

REGULATORY *from page 75*

cate compensation for the effect of inflation. This we find both unnecessary and inequitable."

The question that might well be asked of the Commission if earnings of utility equity securities have indeed increased at the same rate that inflation has progressed. Furthermore, it would be interesting to know whether the market price of utility equities has advanced as rapidly as say the increase in the Consumer Price Index which is one of the major indicators of inflation.

If, as the PSC contends, that the market place through the so-called "informed investor" evaluates all risks of inflation, how can there be the so-called "duplicate compensation" if it allowed a current value rate base? A fair value rate base resulting as it does in better earnings would reduce the earnings price ratio of utility equities and hence reduce the overall rate of return. The fundamental need is of course to match current costs of capital against a current rate base in order to produce an equitable level of earnings.

The Commission allowed the Company to retain amounts arising from the use of accelerated amortization under Section 168 to be retained in the rate base.

Special Interview

Khrushchev Covers Up For Problems At Home: Nixon

The U-2 incident was just a face-saving excuse seized upon by Mr. Khrushchev to get out of negotiations with the West with some semblance of grace, according to Vice President Nixon in a recent interview in Washington.

According to Mr. Nixon, the Russian leader was actually beset with a complex of problems, both at home and in his satellite relations which made it imperative for him to do nothing which might weaken his position further. Negotiation, and some necessary conciliation, could only have led him further into difficulty.

Probably the major problem was that Khrushchev was on a limb with regard to the Berlin situation. After talks with President Eisenhower here last February, he evidently went away with the feeling that we would make concessions on the Berlin problem, said the vice president. He believed he could negotiate a satisfactory solution, which would leave the Russian position in East Germany strengthened. After the Big Three meeting, he realized that the West would not give in on Berlin and that he could not hope to gain an advantage by negotiation.

Under Fire From Military

Mr. Khrushchev was also under fire from some members of the party and the military for recent cutbacks in the Russian armed forces. The move was evidently taken by these critics as a sign of weakening in the struggle with the West, Mr. Nixon said.

Further problems arose due to the economic failure suffered in certain sections of the USSR. Harvests did not come up to expectation resulting in shifts for a number of local and regional officials. There were other financial problems created also by the shift in the party line to allow workers a few more luxuries, with the resultant change in production programs for industry.

Then, Mr. Khrushchev found himself confronted with public opinion,

Editor's Note: Vice-President Nixon, on the day the President returned from the Summit meeting, was interviewed by a national business press group, including EL&P's Bob Lincicome. This is his report.

for the first time in recent Russian history. To reestablish himself in the eyes of party leaders, it was necessary that he take a strong position at the Summit meeting and not waver.

A final cause, and probably not the least of them, was pressure from Red China's Mao Tse-tung.

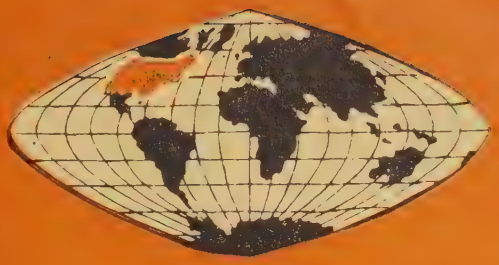
World Tension To Continue

What will result from the failure of the Summit meeting? Mr. Nixon believes that there is presently little chance of war. "After a month or so," he said, "we will most probably enter a period of international tension which may continue for 25-50 years.

"The greatest danger to America today is not military weakness or atomic war," stated the vice president, "but rather the inability to see where the battle is really being fought." He cited the growth of Communism in Africa, the Near East, South America and almost in our back yard—Cuba, where there is a socio-economic awakening, backed by the Communist's long-armed international organization. This, Mr. Nixon stated, is why our Foreign Aid program is so important now.

EEI CONVENTION

REFLECTS BOLD PLANNING FOR THE ELECTRIFYING 60s



LEADING THE WORLD IN ELECTRIC POWER

The AMERICAN Way

IN THE LARGEST meeting in the history of the Edison Electric Institute, a record-breaking 3800 representatives of the electric light and power companies of the nation assembled this month in Atlantic City to focus attention on the inspiring convention theme: "Leading the World in Electric Power—The American Way."

The widely recognized authorities selected to delineate areas of importance to the future of the industry covered research and development, the power supply system of the future, financing the expansion of the Sixties, plans for the national *Live Better Electrically* sales promotion activity, electric home heating, and aspects of employe and public relations.

Backdrop for convention deliberations, as always, was the industry's almost phenomenal growth picture—past and future. Reiterating the remarkable statistics in the Institute's recently released study of the requirements of the 70's and 80's (see EL&P June 1, p. 47), EEI's Pres. Allen S. King observed: "We can see the future in broad strokes . . . we can foresee increasing sales effort, growing demand, growth in capability to meet demand.

"But, we cannot foresee the thousands of new ways electricity will serve us. We cannot imagine the effect that all-electric living will someday have on our nation, in our homes, and in our own lives."

To continue their confident march into the Sixties, industry leaders left the convention city this month with a new man at their head. He is the forceful, assured president of the Connecticut Light & Power Co. and EEI's incoming president—Sherman R. Knapp. EEI's new V-P is Duquesne's Philip A. Floger. And, for top honors among utilities:

Commonwealth Edison Co. was named the winner of the Edison Award on the basis of their enlightened, significant contribution toward development of economic nuclear power through their efforts in constructing and operating the country's first full-scale reactor plant—the Dresden Nuclear Power Station.

Neighborhood Service—Foundation of World Leadership

It is my hope that our companies will continue telling the facts about our economic system, our industry, our companies—for only this will enable us to continue "leading the world in electric power—the American way,"

Says Allen S. King, President, Edison Electric Institute, and President, Northern States Power Company.

After having spent a year travelling around the country and visiting with electric company people at meetings of various kinds, I have gained an even greater feeling of confidence for the future of our business than I had before. We are citizens wherever we serve, and have created good corporate images in our own operating areas . . . and this should give all of us real confidence in our industry's future, and in our ability to meet whatever challenges we may encounter.

A year ago at the New Orleans Convention, I stated that it would be my purpose this year as I travelled around the country, to emphasize the need for the "Main Street" approach to our industry problems. Basically, the job of serving electricity to people is quite a personal and local activity. Even in our larger companies there is a neighborhood aspect to all of our business dealings.

It is at the neighborhood level that our companies have their greatest challenges. A consolidation of this neighborhood approach by all of our companies would go a long way toward favorable solutions to certain of our national problems.

Our strength is in our great record of expanding service to the homes, farms, and industries of our country—the unprecedented job we have done in bringing electric service and its benefits to all Americans. But, paradoxically, it can be said that some of our most aggravating challenges stem from the very excellent job we have done, and are doing, in expanding the use of electricity.

In the process of increasing the use of electricity most of our companies have been growing bigger and it becomes increasingly difficult to impress upon the customers our identity as investor-owned companies which are actually an integral part of the American free enterprise system. This problem of maintaining the identity of our organizations as investor-owned companies is a continual one. Related to it is the problem of making sure that people know that our companies are not "Wall Street" owned and controlled, but are owned by thousands upon thousands of individual Americans.

In this process of rapid growth we seemed to have developed a split personality in the eyes of many people. That is, customers may view their own local electric company with approval—yet somehow they do not transfer many aspects of this image to the industry as a whole. Instead, they seem to view the whole industry in a different light despite the fact that the industry, as a whole, consists entirely of independent investor-owned companies like the one they feel serves them so well. We will have made a great advance in our industry's public relations if we could find a method of bringing to the industry image the features of individual approval that our own companies have, and at the same time building up and transferring to the companies some of the aspects of the industry image which would be of value at the local level.

The factors involved in this complex problem are under study now.

The determination with which we tackle these problems in our own back yard will be of great significance to the future of the industry and every company in it.

Whatever our activities may be—on "Main Street" and in our national associations—we must give emphasis in telling our story to what we are doing for people now, and what we will be doing to meet individual community and national needs in the future.

Of all forms of communication, word-of-mouth is still the most effective. Even with all the claims on peoples' attention being made through TV, radio, newspapers and magazines, the most lasting impression results when someone you like and respect tells you something. Here is an opportunity for all of our employees—and certainly our wives—to enter into this "Main Street" job of telling our story to people.

All of the facts about our economic system—the facts about our industry—and the facts about our companies, must be told along "Main Street," and they must be told in "Main Street" terms. It is important that we identify ourselves as "Companies," and it is important that we tell the story of the ownership of our utility companies. If we can bring people to understand that the real owners of our electric utility companies are thousands of small investors all across the country, we will have taken the long step toward maintaining our industry as

an integral part of our free economy. It is my hope that our companies should be given attention in this educational program:

1. We must tell people what we are doing and what we plan to do.
2. We should use the neighborhood aspects of our business and solve our problems largely on Main Street.
3. We should attempt to eliminate the split personality we have acquired—and try to translate favorable company images into an industry image.
4. We should identify our companies as free enterprising business organizations.
5. We should tell people how we were founded in the free enterprise tradition—are still business enterprises—and should remain so.
6. We should point to our hundreds of thousands of owners—that we are not Wall Street controlled—and that certain past history is out of date.
7. We should take our part in the present activity to inform people about our American economic system—and what it means to them as individuals.
8. As companies—we should all be engaging actively in telling this story to people—our neighbors.

As we tell this story it is well to remember that people react strongly to "What's in it for me." Our American way of life has produced innumerable benefits for the individual Tom, Dick and Harry working on "Main Street." If we are to maintain this system that has brought our country to world leadership, it is essential that each Tom, Dick and Harry—and their wives and families—understand "what's in it for them" in our American way of life.

This free way of life will continue as long as we are able to maintain our free economic system—limit the role of government in the lives of our individual people—and maintain the electric utility industry as part of American free enterprise. Only in doing the necessary educational work will we be able to continue "leading the world in electric power—the American way."

The Rural Electrification Balance Sheet

We must invite and urge the co-ops to benefit from and contribute to the planning of the nation's electric industry . . .

Says Walter L. Lucking, President, Arizona Public Service Co.

Both the investor-owned electric companies and the REA cooperatives have a direct responsibility to help the American farmer meet the challenge of the nation's growing population by further modernizing farms and increasing production through expanded use of electricity.

Today, 97 percent of the nation's farms are electrified. Nearly half—43 percent—are customers of investor-owned utilities; 40 percent of the remaining farm customers are served by REA co-ops who purchase their entire power supply from private companies. This means that not only do investor-owned utilities serve directly nearly half of the nation's farms, but we have assumed the responsibility for supplying the power needs for 66 percent of these rural customers.

As we look today at the "Rural Electrification Balance Sheet" I think it is appropriate for us to keep two things in mind. First, REA co-ops are a big business, profit-making operation; and second, they are in business legally. Whether we like it or not, we must face up to the fact that REA co-ops are here and are in business in practically every state in the union. Federal laws provide the means whereby

they obtain cheap 2 percent money for growth. Since they show a "net margin" rather than profit, they pay no income taxes. Various state laws provide additional encouragement for these electric systems.

Rural America's economic development and growth is proceeding so rapidly that its electric power consumption has been doubling every four to five years, compared with seven to ten years for the nation. An important factor in this growth pattern is the continuing movement of non-farm families, business and industry from urban centers to rural areas.

This is made strikingly clear by the fact that non-farm elements now use more REA-financed electricity than farmers. The REA's report for the fiscal year 1959 tells us that *non-farm* customers accounted for 54 percent of total power sales. Moreover, about 75 percent of their 131,500 connections were *non-farm* rural consumers, a ratio of 3 to 1 over the farmers. This proportion is bound to widen with the continuing growth of non-farm population and industry in rural and suburban areas.

It is the goal of investor-owned utilities to bring the best possible electric service to *all* customers at a continually lower cost. We must operate as economically as possible in order to insure a fair return to the investors who put up the money that enables us to keep up with and stay ahead of the nation's dynamic growth. Our responsibility to customers, investors and employees has never been greater.

The basic question is whether or not the development of the electric business in this country will be under free enterprise or whether the government will have full control of this industry.

Most co-ops consider themselves as locally owned, controlled and managed. They claim the right to operate on an equal basis with investor-owned companies in performing their service operations. Their only route to bring this about is for them to accept the full responsibility of business as well as enjoy the privileges of business.

It is time for the REA leadership to turn from a negative program which builds weakness rather than strength. It is time that these people forget what they can take away from America and start thinking of what they can contribute to its economy. It is time for them to realize that their efforts are undermining the basic forces which have produced the dynamic growth of this nation.

As the integration of facilities continues at an ever increasing rate and as we make greater technological strides, can or should we ignore the REA co-ops? Should we isolate them from our forward planning and shunt them aside to fend for themselves?

No, if the best *overall* public interest is to be served we must invite and urge the co-ops to benefit from and contribute to the planning of the nation's electric industry. To achieve this goal requires the assumption of responsibility and leadership by the management of private companies and co-ops alike. Electric companies and REA-financed cooperatives can start on a two-way street of cooperative effort. Together we can find the avenue that will lead us to the solution of technical and operational problems.

Live Better Electrically—Key to the Electrifying Sixties

We will succeed, as any other American business does, only by having the courage and imagination to compete . . .

Says R. G. MacDonald Vice-Pres. M'k'ting, West Penn Power Co.; Chairman, Planning-Task Comm., Live Better Electrically Program.

My purpose here is two-fold: First, to report on the progress of the Live Better Electrically program and briefly review the advertising that has now been approved for the next 18 months. And second, to ask every company in EEI and every manufacturer and every trade ally to take a direct and active part in this total electric living crusade.

In our research, the objective was to find out how utility management and sales executives felt about the LBE Program in its first years. Only 1 out of 3 felt that the national electric program was strong, while 71-percent rated the AGA Program favorably. Perhaps it's significant that 86-percent felt that the LBE Program was *improving* while only half as many credited AGA with making comparable progress. (I might add that AGA's national promotional budget is about 120-percent larger than ours.)

One unmistakable fact stands out from these surveys: The two segments of our industry who carry the ball at the local level—the utilities who sell the energy and the dealers who sell the appliances—both have the distinct impression that the gas industry is out-promoting us at the national level. If we are not doing a strong enough job to excite our *own* people, how can we hope to excite the public? Exactly what is going on in the public's mind? What is the public's attitude toward electricity? What does it expect of our industry? Indeed, is the public really receptive to our total electric living story? There is not a shred of doubt, not the slightest question, that the public *wants* to Live Better Elecrically, and *expects* to do so.

The obvious assignment of our industry—the utilities, the manufacturers and all our allies—is to hasten the movement of gas users toward the admitted goal of total electric living. This clearly suggests that our task is to describe our exclusive competitive advantages over gas *so the consumer can weigh the facts and make a wise choice.* In researching utility executives, we have found that they *want* a more competitive Live Better Electrically program. In researching appliance dealers, we have

found that we *need* a more competitive Live Better Electrically program. In researching the consumer, we have found a strong desire for electric living and a desire for the competitive facts that will *justify the electric way of living in which they clearly believe.*

With such an unmistakable mandate, the Live Better Electrically Policy Committee drew up a statement of policy.

"Live Better Electrically"—Statement of Policy

The broad, strategic objective of the Live Better Electrically Program is to sell more residential kilowatt-hours by featuring specific competitive equipment within the total electric living concept.

This goal dictates these tactical objectives:

1. **Create customer preference for electrical use that is directly competitive with other fuels. This means selling the benefits of electricity and, with honesty and good taste, calling attention to the advantages of electricity as compared wih its competitors.**
2. **For maximum effect, concentrate this effort on *only* the most critically competitive subjects which are:**
   (a) Range, Water Heater, Dryer; (b) Heating and Cooling; and (c) Medallion Home.
3. **Blend HOUSEPOWER and Lighting into the advertising wherever possible. (The 1960 program includes HOUSEPOWER and Lighting ads.)**
4. **Provide for national coordination of the preference-building job with the local selling effort of member utilities.**
5. **Multiply the effect of the program at all levels by encouraging cooperative effort by other electrical industry members."**

With this set of objectives committed to paper, the next step was to organize what is known in advertising as a Copy Platform. Based on the results of field research, the following Copy Platform was written and adopted:

1. Be sharply competitive with other fuels. Do this by exploiting the exclusive consumer benefits which stem from the fact that ELECTRICITY IS FLAMELESS.
2. Persuade the woman in our audience that she will increase her stature as a smart *home manager*—in the eyes of her husband—by using electric appliances.
3. Project a picture of *all* members of the family living better electrically. What we are selling is for the benefit of the entire family.
4. Give prominent and consistent display value to the theme line . . . YOU LIVE BETTER ELECTRICALLY.

Now, I would like to address four ideas specifically to the presidents and other officers of utilities represented at this meeting:

1. It is evident from all of our research that our advertising must be competitive. There is no point to our investment if our advertising is not competitive enough to win business from other types of fuel. We must state the case for electricity *as a service to the* public so the public can make a wise choice.
2. When you go home, we hope that you will ask your people to tie in your local promotions with the national program—using the word "flameless" and the slogan "You Live Better Electrically" and portraying the family benefits of electric living. This national program will not do your local job. All sales are made locally. But keep in mind that by repeating locally the selling messages that are used nationally, your local investment will be substantially more effective. Our leadership program needs your direct and active leadership in your own companies.
3. Perhaps you agree that each company should help finance the Live Better Electrically Program from a separate budget, rather than borrow funds from our local promotional budgets and thus reduce our ability to capitalize locally on the opportunities set up by the national program. The LBE program is an additional promotional effort, not a substitute for the local job.
4. The Live Better Electrically program was conceived and is being operated for the benefit of the entire electrical industry—not just the utilities, not just some utilities, but for all electric utilities, all manufacturers of electrical equipment and all our trade allies. It is imperative that all segments of our industry recognize that, as the industry prospers, so does each part of it. When we consider the objectives of the Live Better Electrically program, there is no such thing as a straight electric company or a combination company—we are all electric companies. In this concept, it seems right, desirable and good sense for all companies to contribute and have a voice in this family affair. We ask the full cooperation of all utilities, all manufacturers and all our allies—so we may all rightfully share in the benefits.

Employee Relations In Perspective

In the period ahead, more than ever before, it will take great foresight, ingenuity, patience and careful planning to properly build and conserve the human assets of a company.

Says Howard S. Kaltenborn, Vice President and Assistant to President, Westinghouse Electric Corporation

The subject of employee relations is not like any of the physical sciences, where a new concept or a new discovery may revise all our projections. History is the only thing we have to go on, and management decisions in this crucial area should certainly be firmly grounded on facts. Those facts can be determined only through experience, through research into past events, and through logical analysis of these events. Given such a perspective, I believe, we can see and interpret the whole flow of events in proper interrelationship.

Management now has the great opportunity to use industrial relations techniques that did not exist before World War One; that were only half developed before 1930; that were forgotten in the 1930's; and that could not be fully used in the 1950's. In my judgment, management today has an opportunity, unparalleled within the past quarter century, to influence the course of industrial relations along constructive lines. How effectively management seizes this opportunity will, I believe, decisively determine the general course of industrial relations for years to come.

The management of Westinghouse Electric Corporation has one main objective in formulating and administering the company's industrial relations plans. Stating that objective in the simplest terms, we want our employees and members of the communities in which we operate to regard Westinghouse as "a good place to work."

We want them to build up a sense of identity with the company of which they are a part. We want them to cooperate willingly in the productive effort upon which the profitable operation of the company depends.

In so doing, they will themselves contribute to the solidity of Westinghouse as a place of employment. They will do this both as employees and as citizens of the communities surrounding the company's operations. Employees who develop constructive attitudes play an important role in influencing public opinion locally regarding the company.

We believe that such constructive attitudes can be built and maintained through fair treatment, opportunities for progress, keeping employees informed, and making it possible for them to get prompt and fair consideration of their grievances.

In changing and keeping the industrial relations plan current, we use all meaningful and effective ways to seek out the facts. We use opinion polls. We study grievances and grievance trends. We encourage frequent personal contact between employees and their supervisors. We urge division and product department managers to get out frequently on the shop floor where the people, the problems and the opportunities are.

Another action taken by management was to recognize and affirm the fact that industrial relations is basically a line responsibility stemming from the top executive level, and that it is a responsibility which cannot be delegated to staff and then forgotten.

Our effort to achieve enduringly sound employee, union and community relations places on every member of Westinghouse management a two-fold responsibility—a personal responsibility for building good attitudes among those in his immediate surroundings, and a responsibility for seeing that the same responsibility is fulfilled by the management group under his supervision.

In other words, building good employee attitudes is an essential part of the management job. It is, moreover, a major responsibility of *all* levels in the management organization—not alone of the personnel department, the industrial relations people, or any other specialist staff group.

Westinghouse has established relationships with many unions. Our philosophy and approach is in no way anti-union. Rather, we accept unionism as an institution that is here to stay, and as one with which we must learn to live constructively in the mutual best interests of all concerned.

In line with this philosophy, we urge our employees who are represented by unions to participate actively in the affairs of those unions. We believe that apathy on the part of such employees—that lack of interest and participation in the affairs of their union—does not benefit either the employee or the company, but rather could harm both.

American workers are good workers. They are moderate in their viewpoint, both politically and economically, and have steadfastly rejected extremists both of a too radical and a too conservative orientation. I am confident they will continue to do so.

The next ten years will be a period of critical importance to American industry; and in these years the American worker will play an important, perhaps a decisive role. It will be a decade of rapid change, with dimensions we can now barely glimpse.

As management men, we must be prepared to cope with this danger, this opportunity, this change. Our chances of doing this will be infinitely improved if we can achieve the quality of employee relations so urgently required.

The Role Of Research In The Electric Industry

By increasing our research effort and by organizing ourselves . . . our industry can continue to spread the benefits of electric service in a multiplying variety of ways . . .

Says Philip A. Fleger, Chairman of the Board and President, Duquesne Light Company

Through the whole fabric of electric industry research, the key pattern is "team work." There not only is team work among the men and women in the laboratories, there is team work among our companies. There is also team work among our companies and our many allies: the electrical manufacturers, the independent research groups, and the universities.

Of course, much of the research being carried on by the electric companies is conducted solely by the companies themselves. In fact, a recent survey by the Edison Electric Institute disclosed that 968 projects were either in progress or had just been completed by EEI and its member companies.

One measure of the scope and magnitude of the electric industry's research effort is in terms of the dollars being spent. A recent EEI survey of 120 electric utility companies gives an indication of the amount of money our industry devotes to engineering and non-engineering research. According to the survey, these companies spent more than $6½-million on research in 1959. This year, 1960, they estimate they will be spending in excess of $8-million, excluding nuclear power research.

Last year electric utility companies spent more than $100-million on various phases of nuclear power research, including the construction of nuclear power plants. In 1960 they will be spending another $132-million.

To these direct expenditures, however, we must add the amount electrical manufacturers spend on research for the electric utility companies. It has been estimated at between $100-million and $125-million annually.

Is our research program adequate? How should the electric utility companies approach such research problems as direct energy conversion, future load forecasting, and energy utilization? Should the research be carried out by one company, by a group of companies, or through a centrally directed program supported by all companies?

Answers to questions like these are being carefully studied by EEI. The amount of research undertaken by the Institute has increased substantially. In addition, a survey of prospective research projects by the Research Projects Committee clearly indicates that this trend will not only continue but actually will accelerate if the necessary funds are available. But research conducted by the Institute is financed out of the Institute's general funds, and it has now reached proportions which will require additional funds, if the volume of work is to increase. Consequently, if the scope of the Institute's research program in the future is to be determined on the basis of the merits of projects which are proposed by the various committees, rather than by arbitrary financial limitations, some new method of financing the Institute's research program must be developed.

Therefore, the Institute's Board last December decided to investigate the possibilities of financing an expanded Institute research program on the basis of voluntary, slide-scale contributions along the lines of the Live Better Electrically program. It now appears that the Board will be in a position to take action on proposals for such a program in September.

While provision will have to be made for some new method of financing Institute research, there appears to be every reason to continue the present controls exercised in deciding what projects should be undertaken. On the other hand, in view of the increasing importance of research and the rate at which this activity is expanding, consideration is being given to establishing a new division—the Research Division—within the EEI organization. This new division would have the same stature as the Engineering and Operating, the Sales, the Accounting, the Customer, Employee and Investor Relations, and the General Divisions of EEI. It would be built around the present Research Projects Committee, which has been doing such a commendable job for our industry. Complete control over the program would lie with the Research Division and the EEI Board.

A Research Division within the EEI framework is a natural outgrowth of the industry's present research activities. Its formation would give research projects their proper standing among industry activities. At the same time, it would strengthen the framework which, at some point in the future, might be called upon to bear the added weight of an enlarged research effort. Such an organization would not replace or conflict with the research activities of individual electric companies or with the activities undertaken by small groups of companies. It would, however, provide a regular, accessible medium for the exchange of information between companies concerning their research activities. It would also make it possible for many of the smaller companies which are not able to do research work of their own to participate in this important work. Nor would such an organization impede the competition between the electrical manufacturers in the research field. This competition has proved too valuable to be disrupted in any way.

Power—Its Contribution To Our Future

This industry and its people are peculiarly qualified to meet the challenge . . . of bringing about the full realization of the heritage of this beloved nation,

Says Frank Pace, Jr., Chairman of the Board, General Dynamics Corporation.

It's not enough for this nation merely at this juncture to try to continue to provide a better way of life for its people. This arises because of three changes that have occurred in the last decade.

The first is that in the past the world was headed by friendly allies. Now we have a ruthless, combative opponent in the world.

Second, the very outburst of population growth has created a whole group of new nations striving for nationalism, for self-development, for a standard of living that, in terms of growth, is more rapid in terms of their desires than anything that has existed in history before.

And third, the great powers of the West and the great powers of Communism are competing, not just for the minds, but the economic, political and military support of these people.

Now, I think that this industry and its people are peculiarly qualified to meet that challenge because the very nature of the industry calls for long-range planning. It's an essential ingredient of your industry that you think not one, two, three years ahead, but 5, 10, 20 or even 40 years ahead. It's second nature to you, and it's this kind of planning, as opposed to living year-to-year, that's essential in this nation that is ours.

Moreover, too, I think that you are qualified because it has been the nature of the industry to face big problems and to recognize their implications.

And, finally, by one of those strange coincidences of mankind, there has been placed in your hands one of the vehicles which lends itself to the preservation of our way of life—atomic and nuclear energy.

Frankly, I have been proud of what I think is the statesman-like way in which the industry has tackled this problem. It would have been simple, and I am sure there are those who thought it would have been wise, to sweep the new challenge under the rug, but, instead, we moved out aggressively, courageously, and tested it. You laid a basis for a program of peaceful atomic development around the world. You have had in mind the serving of the nation, and ultimately, the requirement of serving the world. I hope that statesmanship is preserved and improved upon.

Electric Heat—The Big Market Of The Sixties

When you consider the dimensions of the electric heat market . . . it is easy to understand why many students of marketing call it one of the greatest opportunities ever to confront our industry,

Says Thomas G. Ayers, Vice President, Commonwealth Edison Company.

Let us start by looking briefly at the whole indoor climate conditioning market of which heating and cooling are twin components.

There are 50-million residential electric customers in the country. Six-and-a-half-million now have room air conditioners. Another 900,000 have central cooling, or, in total, 14 percent have air conditioning. Nearly all of this growth has taken place in the last decade. Last year the residential cooling equipment market grossed about $800-million, up 17 percent over the previous year.

On the other hand, electric heat customers, while doubling in the past three years, still number only 600,000. Ten-year projections vary from 3½- to 4½-million, or 6 percent to 7 percent of the expected 60-million customers. As contrasted with air conditioning, electric heat must compete with firmly entrenched heating devices. So the heating portion of the climate conditioning market, which is virtually inseparable from total electric living, has just left the starting post.

An all-electric home offers the manufacturer the potential of some $1500 more in equipment sales—wire, cable, switches, appliances, etc. An all-electric customer will use at least 20,000 kilowatt-hours a year—six times the present national average. The projected four-million electrically heated homes could use 80-billion kilowatt-hours—nearly half the electricity all residential customers used last year!

The vista of the electric heating market is 50-million present dwellings and upwards of 1¼-million more each year. Electric heating equipment manufacturers grossed only about $100-million last year, but in less than a decade it is envisioned as a billion dollar a year industry.

Are manufacturers really alert to the versatility of electric heat? In one form or another, it is adaptable to any condition, any situation, any preference. Would they be wiser to broaden their line rather than to insist on baseboards where ceiling cable would be better, or resistance units where the heat pump belongs? Sometimes the best application within a given house calls for more than one type of electric heating equipment.

Moving from production of heating equipment to its distribution, electric heat poses several new challenges. Realignments in the traditional distributor-dealer-contractor-builder relationships are inescapable. How the manufacturer ties together the heating contractor, the electrician, the supplier of insulation, storm windows, appliance distributor, etc., is difficult to foresee. It means disturbing time-honored prerogatives and habits. It will require a high degree of local variation to solve the problems that arise.

Have our engineers and rate people evaluated the heating kilowatt-hours and the corresponding cash that will flow into our tills? Or do they tense up over the load it imposes?

The electric heat market is composed of many elements, each with varying degrees of interest. These include not only the manufacturer, distributor, architect, heating contractor, electrician, and builder, but also the mortgage lender, appraiser, and FHA officer. All need to be organized into a unified effort.

A utility responsibility in developing the electric heat market is to sell and sell *hard*. This means an aggressive field force to work with customers, architects, builders, and contractors. Such a force must be thoroughly schooled in all phases of building. They are not selling an impulse item. It is a quality product and must be sold on the basis of advantages it offers. Nevertheless, they need to be equipped with good promotional tools to close the sale.

Private Enterprise and Public Service In A Free Society

Speaking for 178,000 of the nation's physicians, I hope that you will stand beside us, and fight beside us, in our effort to resist this latest incursion by government into a field in which it does not belong,

Says F. J. L. Blasingame, Executive Vice President, American Medical Association

You have been compelled again and again to fight against federal encroachment.

So have we.

You are still being compelled to wage this fight.

So are we.

And let us not deceive ourselves: We must be prepared in the future to fight even harder than before—to redouble our efforts, to make our voices heard so clearly that no one can fail to understand.

This is not merely a matter of survival; it is a matter of keeping faith with the future. I want to make this fact plain; I want to preserve, to protect and to promote the private, non-governmental practice of medicine in the United States. Anything that helps the attainment of this objective, I am for. Anything that hinders or undermines the attainment of this objective, I am against.

The medical profession is dedicated to the easing of pain, the healing of the sick, the prolonging of human life. But it canot function effectively at these tasks unless the physician is allowed to practice medicine in the climate of freedom.

It is not enough to affirm—however eloquently—the principles upon which this nation was built. The medical profession recognizes, as you do, that deeds always are more important than declarations.

We recognize that we must sell principles as well as products, and ideals as well as services, for only in this way can we survive as free people.

Today American medicine is face to face with a new crisis. I refer to the bills introduced in Congress designed—in one way or another—to make compulsory national health insurance the law of the land.

To sum up the AMA's position, sensible, economical health care programs for the aged, that preserve freedom at the same time that they promote security, must necessarily be limited to support for the needy aged and leave to voluntary, competitive, private enterprise, those activities needed to improve the health care of the rest.

It is imperative, in the opinion of the American Medical Association, that the facts essential to ef-

fective planning be obtained in the months remaining before the White House Conference on Aging in January, 1961.

As leaders of a vital industry, I think you will agree with us that a knowledge of the facts is essential to the solving of any problem—particularly one of such complexity and importance as this one:

At the moment, legislation is now before Congress.

The proponents of national compulsory health insurance are using every pound of pressure they can muster to influence legislators facing election campaigns. Both political parties are acutely aware of the upcoming conventions, the resulting party platforms, and the race for the presidency.

In this atmosphere, the counsels of prudence and patience are easily drowned out—unless they are amplified by as many strong voices as possible.

To tamper with a system of private medicine that has made this the healthiest nation in history is a rash and dangerous course. To tamper with that system now, without the facts, would be rasher still.

Congress and the Senate are considering this legislation right now.

What they decide to do will affect every citizen of this country, for at stake are the health and well-being of fifteen-and-half million older Americans; a system of medical practice that has helped make this the healthiest nation in the world's history; and the very strength of the free enterprise system itself.

"Hard-head" Engineering

The "hard-head" engineer stands at the crossroads where science and economics meet. He has one of the most important jobs in this or any industry,

Says James F. Fairman, Senior Vice President, Consolidated Edison Co. of New York, Inc.

What pattern do I discern in my own field of electrical engineering? It is one of step-by-step solving of problems. Some of them were solved by cut-and-try methods. Others resulted from the discovery of a new material, an improved alloy, a better manufacturing method. Some were attained by patiently pursuing the cooperation of designers, operators, engineers, purchasing agents, and policy-making executives of both utilities and manufacturers.

One has to look very closely, and define very loosely, to find anything that can be called a significant breakthrough—a breakthrough that reflects a radical change in scientific thought or that solves for all time the problems in a particular area. We in the utility industry have produced few who will rank with Copernicus, Newton, or Einstein. The names that stand out in the history of electricity are names of men who followed the path of evolution. Franklin and Ampere, Volta and Faraday, Ohm and Davy, Henry and Edison, Tesla and Steinmetz—each built on what was known, and introduced succeeding generations to new unknowns.

In some ways Edison epitomizes the flavor of our industry. Here in one man we find the quality that excited the enthusiasm of financiers, a promoter to rank with P. T. Barnum, a politician who did battle with New York's city fathers, an engineer who conceived an entire electrical system, an executive who directed the manufacture of its parts and its construction, the researcher who never stopped until he found a satisfactory filament for his electric lamp.

Today we have become specialists. None of us are called upon to exhibit as wide a range of talents as Edison. But if we are not as complete men as he, we should be better men in those areas where our interests lie. My particular concern is with the role of the "hard-head engineer" in the continuing advance of this industry.

I suppose that the discovery of atomic fission and its application to the generation of electricity represent the greatest single breakthrough in the history of our industry. Many of us undoubtedly overreacted to its promise. But once the possibility, and the freedom to act upon it, existed, what did we find? We had opened one door only to be confronted with hundreds of others still closed. To problems of heat and temperatures and corrosion we had added radiation.

Having burst through the door into the atomic age, we find we are back where we started—solving problems one at a time, fitting a piece here and a piece there.

Above all, the distinguishing mark of the hard-head engineer is the will to go ahead and try, the desire to get something done. The scientist often discharges his responsibility once he discovers the scientific principle. But the hard-head engineer must adapt the application of the principle to his own particular problem and be willing to spend the time and effort to get it accepted. He must be willing to risk his judgment against the necessary expenditure of money. He must be willing to accept the results of operating experience.

People can be stimulated by our goals, but, without their respect and understanding for the work we must do to achieve them, the high hopes can dwindle as the weeks stretch into months and the months often into years.

The goals we set for ourselves are not our only asset. We also have a proven ability to deliver and a demonstrable will to get things done. We must depend on all three if the industry is to continue to flourish.

Our greatest asset is the people who will do the work and make the decisions. While I have chosen

to highlight the qualities that go to make up the hard-head engineer, these qualities are not limited to the engineering departments. They are found in every part of the industry. They are qualities that deserve more recognition from us, for they are the qualities that can make this industry's future secure. Without these people and their work our voices are no more than "sounding brass and clanging cymbals."

Safety—A Management Responsibility

In discharging its responsibility for safety, there is only one right objective for management to set—and that is the complete elimination of accidents,

Says J. Theodore Wolfe, President, Baltimore Gas and Electric Company.

Thirty years ago—in 1930—312 employees of the Baltimore Gas and Electric Company suffered disabling injuries resulting from accidents on the job. We defined a disabling injury then as we do now: any accident which results in death, or permanent disability, of whatever magnitude, or which involves the loss of eight or more consecutive hours from work. In 1959, with many more employees on the payroll, had the accident frequency rate been the same as in 1930, 460 of our employees would have suffered such injuries. Instead, the number of disabling injuries was eight.

What caused this rather phenomenal reduction in accident frequency over a period of just three decades?

The short answer is simply this: Management recognized that it had a responsibility for the safety of our company's employees and decided to discharge that responsibility.

One of the first acts of Management following its acceptance of the responsibility for safety was to establish an effective Safety Division; and I would be remiss if I did not pay tribute to the outstanding work done by my associates in this division. No company of our size can achieve its safety objectives without the persistent and intelligent aid of safety specialists.

Nor do I want to overlook the significant contribution made by the Accident Prevention Committee of the Institute, in conducting safety conferences, in exchanging information on methods and results, in preparing training programs and materials, in recognizing meritorious achievement, and in numerous other ways. The concern for safety expressed through the work of this committee has been a major factor in reducing accident frequency in the electric industry from 14.02 in 1949 to 6.06 disabling injuries per million man-hours in 1959.

What I am trying to say, at this point, is that industrial accidents will never be eliminated, nor further reduced in frequency to any substantial degree, unless and until management first decides that they shall be eliminated, and then makes its decision known—not just to the safety supervisor or safety engineer, but to the entire line organization, including all of the company's employees.

Now, what I have said thus far is doubtless rather trite. One would have to search pretty hard to find an intelligent management which did not admit to its responsibility for safety. In this enlightened era, being *for* safety is like being *against* sin. Both stances are among the required marks of respectability.

Yet, when I look at a chart which tells me that, for the year 1959, there were still 6.47 disabling injuries for every million man-hours worked in American industry, and when I see that the accident frequency rate in my own industry was not much better than the average for all industry, being 6.06 for electric utilities, I cannot help but wonder if there aren't too many managements who are giving only lip service to this particular responsibility.

Among the 180 companies reporting their 1959 accident experience to EEI, 52 reported a frequency above the industry average, 33 of these were more than 50% above the industry average, 17 were more than double the industry average, and five had the dubious distinction of reporting accident frequencies from five to nine times the industry average. I would not have you think, however, that these remarks are addressed solely to companies with accident frequencies above the industry average. Among the companies with better than average performance, there is need for plenty of improvement before the electric industry can take its place among the exemplars of industrial safety, as an industry so deeply imbued with a public conscience certainly should do.

If safety is taught and practiced as a matter of common sense, as a way of life, even though it may require watchers on certain hazardous jobs, it will not add to the over-all burden of costs but will pay dividends instead.

Safety, encouraged by management and achieved through the common sense application of sound techniques, is a vital factor in developing the kind of human relations within a company which are prerequisite to cooperativeness and to a high level of productivity.

If top management throughout the electric industry will sincerely accept its responsibility for safety and diligently follow the suggestions of our Accident Prevention Committee, I dare say the day will be not long in coming when we can point with pride to a truly commendable performance, one worthy of this great industry of ours.

Good Public Relations Must Be Earned

The success of a public relations program does not depend on what you think of the public, but rather on what the *public thinks of you,*

Says George R. Conover, Vice President, Philadelphia Electric Company

If I were speaking to you as an engineer or scientist, perhaps we could explore in detail some of our outstanding technical advances. However, I am talking to you as a public relations executive. My field is not physics or mechanics or electronics, but p-e-o-p-l-e. I intend to deal with what is popularly known as a "corporate image" and "public relations."

"Corporate image," as used here, means the total impression made by a company on the public. It is a reflection of a company's reputation, integrity, character, and standing in the community.

"Public relations" embraces all human elements of any enterprise, from the private thoughts of an individual to the collective force of public opinion.

Where does a utility start when it sets out to earn favorable public opinion? There is only one place, and that is at the very top. Today's chief executive, who is a far cry from his early predecessor, must lead his organization and by personal example create a favorable corporate image. Some companies today enjoy fine public relations locally because the chief executive takes an important part in top-level activities of many civic, business, welfare, and financial organizations in the area the company serves. By his example he not only inspires others to do likewise but definitely identifies the company as a good neighbor and a good citizen.

Of course, no one man can do the entire job. The chief executive sets the pattern, but his public relations policies must be implemented, preferably by an officer-executive who has company-wide cooperation, who is not restricted to departmental lines, and who reports to the chief executive direct on corporate matters.

In the interest of uniformity and consistency, an over-all public relations program can be most efficiently administered if all activities directly affecting public opinion are coordinated in one department. This would include personnel activities, stockholder relations, publicity, customer service, community activities, safety, and medical departments.

Let us first concern ourselves with the customer. Customers were not created to buy from us. Our business was created to serve them. What our customers think of the way we run our company and how we do our daily job is the foundation of favorable public opinion.

The electric utility business is unique in that our product is made and delivered without meeting our customers. About the only contacts we have with them are the periodic bills and the visits of our meter reader.

Second on our list is stockholder relations.

What does the average stockholder know about a company? Actually, his prime interest is in two things: the market value of the stock and the amount of the dividend. The public relations job here is to keep stockholders informed on company matters such as management policies, growth possibilities, soundness of their investment, and outlook for the future. Our reports to the stockholder must play an important role.

Another major group is our employees. Here we must try not to lose the common touch, but rather to keep the company-employee relationship on a high plane of mutual confidence. Satisfied employees are usually ready and eager to bear witness for their employer. This is of great importance in building good public relations, for thus each employee and his family is an active good-will ambassador. These contacts, in the aggregate, carry great weight in the creation of a good corporate image.

Another important public relations segment includes a variety of civic organizations, such as service clubs, church groups, worthy fund-raising bodies, and other units of community life where leadership and assistance are needed. Both the company and the employee should be identified with these community activities. This applies to the chief executive, who may head a city-wide drive, as well as to the meter reader, who may organize and conduct sandlot sports in his neighborhood.

A most influential group with which a utility deals is the mass communications media represented by the press, radio, and television. It is in this sphere that publicity is vitally important for this is the medium through which company news is disseminated to the public.

The work of the publicity department should also include the developing and placing of both national and local institutional advertising. This advertising serves several purposes. It assists in area development, thus helping the entire community to grow and prosper, and it also indicates to the public that the company is an aggressive outfit, a good neighbor.

From my comments about publicity, it is obvious that public relations and publicity are not the same thing. Public relations is the over-all instrument dealing primarily with matters of policy, with creating and carrying out policies which result in public good will. Publicity is a procedure for acquainting the public with these policies.

In conclusion, let me say that favorable public opinion must be deserved, and good public relations must be earned. Words have significance only when they are backed by deeds.

Free Enterprise and The Future

No society can be truly great where its people do not have both the privilege and the responsibility of freedom . . .

Says Dr. Donald Russell, Former President, University of South Carolina.

Ours is, as everyone knows, an era of challenge, of challenge especially to our American way of life. What we need to realize, though, in a very real way is that the challenge to our American system is a rising, not a receding, tide.

The conflict presented by this challenge is more than a political conflict. It is between two systems that cover the whole range of living—political, economic, social and spiritual. Ours is the system of freedom. The challenge comes from communism which blights all freedoms, religious with the others, and which, as Sir Winston Churchill has phrased it, "rots the soul." It dominates even the family relationships, requiring that they be subordinated to the authoritarian state. It represents, if one may paraphrase the poet, the closed mind, the starved eye, the empty heart and the brutal fist.

To us communism and all its ways strike fear into our hearts. We cannot praise even the professed high priorities it gives to teaching, to the professions and the sciences, because of the purpose of those professed priorities, which is not to make all men free, but to make a few men strong and dictatorial all over the world.

We will not successfully challenge communism, either among ourselves or with people in uncommitted countries, if we fail both to express and to practice our faith in our own system. That is fundamental. In short, we must be as much concerned with what we think and believe and do as we are about what we don't think and don't believe and don't do.

Unfortunately, the phrase "private capitalism" is inadequate to express or to encompass the many human qualities reflected in our system. We must seek another phrase that may more nearly correspond with the broad meaning of the economic part of our free society. That phrase is "free private enterprise," and, more nearly than any other, it conveys the thought behind all this economic framework of our system.

Let us cease to make some distinctions between political freedom and economic free enterprise. There can be no distinction; one is contingent upon the other. They are parts of a common tradition of individual liberty. They are cooperating architects of our culture and civilization.

We need especially to keep constantly in mind that free private enterprise is not the special possession of the so-called capitalist or entrepreneur. It serves equally the rights and promotes equally the opportunities of capital and labor, of rich and poor. Economic freedom is indivisible among all peoples and all classes. The economic freedom of the capitalist is the economic freedom of the worker.

It needs to be repeated over and over again that free private enterprise is the true refuge of the working man and that, without it, labor can never be free. Also it needs to be repeated over and over again that our American system of free enterprise is today giving the worker more money, more leisure, more security, better health protection, pleasanter working conditions, and more generous retirement privileges than socialism ever dared to promise him.

Statism, applied in the economic field, not only undermines freedom, it weakens the whole economic structure of a nation or a people. It has been the reluctant recognition of this fact that has impelled England to turn her back so decisively on nationalization of industry. With a state railroad system that seems to creak from worse to worse and with nationalized industries generally giving a poor account of themselves, even the intellectual leaders of the Labor Party are seeking to cast from their necks the albatross of nationalization. England has tasted the poison of nationalized industries and it wants no more of them. And even the Socialists of that country know it.

Assumption of supreme responsibility by government over the individual and his wants atrophies individual initiative. It creates blind and supine submissiveness that is hostile to progress. It leads to that result contemplated by Thomas Jefferson when he wrote: "Were we directed from Washington when to sow and when to reap, we should soon want bread."

I may add that sometimes it appears we are approaching dangerously near this condition.

Let us proclaim free enterprise as a basic part of our heritage and our faith, and let's be enthusiastic about it.

America's Power Supply Systems — Present And Future

Further pooling of capability, standardization and installation of large efficient units, cooperative utility — manufacturer research, being good citizens, and telling our story will help us achieve our future goals,

Says Charles E. Oakes, Chairman of the Board, Pennsylvania Power & Light Company

The start of a new decade is a good time to pause and take stock as to where we are and where we are going.

The investor-owned utilities have the responsibility to: Furnish an abundant supply of electricity for use in the areas they serve; Anticipate future needs well in advance of the time the power will be required; Give first-class service at the lowest practicable price to their customers; Conduct research and development of all phases of their business in the public interest; Assure efficient operation and management by attracting the services of capable and well trained men and women; Contribute their full share to the support of our government and the defense of our country; Support sound regulation by regulatory bodies at Federal, state and local levels; Merit the confidence of their customers, the investors in their securities and, the general public; In every way, be good citizens . . .

To date we have met our responsibilities in full. We confidently expect to do so in the years ahead. Each company is well informed as to where it is, and where it is going. Every utility keeps up-to-date forecasts of the power needs of its area, and has formulated plans to meet its future power requirements.

The economists foresee for 1980 a value of our nation's goods and services of nearly one trillion dollars in terms of constant dollars—double today's figure. To reach this level will require a greatly expanded use of electricity—almost three kwh per dollar of gross national product in 1980 as compared to only 1⅔ kwh today.

By 1980, 411 millions of kw of new capability must be built, of which 87 percent is the job of the investor-owned utilities. This leaves a substantial amount of capability to be installed by government and cooperatives.

There is no real need for government to install this capacity. I want to make this very plain. The investor-owned utilities stand ready and able to meet in full the future power needs of the country. They are ready to enlarge their plans to supply all the necessary facilities, and will do so if given the opportunity. This would result in enormous savings in tax dollars which will otherwise be spent needlessly.

It seems evident that the main reliance for the power supply of the foreseeable future will be modern fuel-burning, large-scale generating stations. Of the over 356 million kw of capability to be added by the investor-owned utilities up to 1980, 85 percent will be of conventional fuel-burning type.

The industry estimates for 1980 an aggregate of close to 40 millions of kw of nuclear power based on what is presently known of the progress in nuclear technology. However, if research and development overcome the competitive gap between nuclear and fossil fuel power at a faster pace than is now anticipated, the installed nuclear power capability could be substantially larger. At least now, we are assured of an ample fuel source to power American industry and civil life for hundreds of years.

As I look at the future of the investor-owned utilities, these are some of the opportunities that we have before us.

As the loads grow and the capacity increases, further expansion of power pooling offers possibilities of additional savings and improved operation. This growth will be on a regional basis, and will be governed as to extent and type by local conditions. The process will be aided by long-range planning of transmission lines and interconnections. The most successful power pools of today exist in situations where this has been done in the past.

Savings in capital expenditures can be obtained through standardization of turbines and generators over the entire range of sizes used by the industry. The possibilities seem to be especially favorable in respect to large-sized units operating under high pressures and temperatures. The standardization process should be related not only to sizes, but also to pressures and temperatures.

The idea could well be extended to other items of equipment.

To carry out this idea, the industry should not expect the manufacturers alone to do the job. The companies must take the lead in this matter, but they must take great care that standardization does not develop into a "road block" to future technological progress.

As the demand grows for additional power, great use will be made of the maximum size of units suitable for each situation. Greater opportunities will present themselves to locate on advantageous sites, in respect to load centers, fuels, water and

the many other factors involved in power plant location.

Manufacturers tell us that they are willing and able to make a unit of a million kilowatts, and that there is no technical barrier to line voltages of one million volts or even higher.

It is my belief that it would be advantageous both to the manufacturers and the utilities, if the two got together, and scheduled the new units to be installed in such a manner that the manufacturing facilities would have a uniform rate of production.

As we push ahead into the last half of this century we can look for a rapidly increasing economic momentum. Population will continue to grow. Business and industry promise substantial expansion. Research and scientific development offer assurance of even greater progress in the coming years than we have seen in the past.

But to realize fully what the future holds depends in great measure on what we do today. Wise long-range planning in the use of our resources is needed.

It is toward this end that our industry is taking this look ahead. What we have projected is a realistic appraisal. The investor-owned utilities are well prepared to take care of the greatly augmented power needs of the future, standing on their own feet, and to do so without recourse to the public treasury.

I am confident that we merit the public's support necessary to carry out the program that I have outlined to you today. But we must tell our story. Our own customers do not know these facts and we must accept the responsibility to see to it that they are informed.

A recent opinion survey for the Electric Companies Public Information Program, based on a properly selected sample of electric company customers, shows that only 52 percent of our customers believe that our companies can be relied upon to provide *all* the power that is needed for our country's future. Some 29 percent believe that government help is required. And 19 percent do not know if they can rely on our companies or whether government help is necessary.

Here is the key fact. More than two-thirds of the 29 percent who said that government help is needed took this position because they feel the job to be done is "too big" or "too expensive" for our companies to handle. Here again we have proof that *the lack of widespread knowledge* of the facts about our industry's past record, our plans, our capabilities and our resources, is what is really hurting us. And it is hurting us much more than any ideological bias against our industry, yet is much easier to correct.

So let us tell the story of our industry's capability to meet tomorrow's power needs. And let us continue to bear in mind that though this story may come to be old and familiar to us, this is not the test. The criterion is widespread knowledge and information about the electric industry. We must keep at our information work and programs until the evidence at hand much more fully demonstrates that in this area we have done the job that is before us to do.

Financing the "Sixties" Expansion Program

By considering the views of these authorities and benefiting from them to the fullest extent, the electric utilities can help in obtaining the funds that will be required . . .

Says H. H. Scaff, Vice-President Ebasco Services, Inc. (Panel Moderator)

Four outstanding financial authorities have joined with us in an endeavor to throw light on these vital questions:

1. Will the money required to meet the expansion program be available to the utilities?

2. Where will the money come from?

3. What can the utilities do to make their securities more attractive?

Here are some of the helpful suggestions made by the panelists:

G. M. Ives, vice-president, Morgan Guaranty Trust Co.—The commercial banker can "temporarily ease your problem," he cannot as a rule do more than that.

We can provide you with cash to pay your bills until such times as you choose to go to the market with your long-term securities. We can give you thus a flexibility in the timing of these sales; we can tide you over rough market situations; we can stand

Panelists were: Gerald M. Ives, top left; H. H. Young, top right; F. W. Page, bottom left; and G. T. Conklin, bottom right.

by against the hazards of delayed regulatory approval or prolonged rate cases clouding your earnings picture; and any similar factors that your financial officers must weigh before coming to market.

There are things we cannot do, however. We cannot supply you with the type of money you must eventually raise, and we cannot save you (and conversely we cannot cost you) any appreciable amount because of the difference between the cost of our money and the cost of long-term money.

Your unfunded additions are in the nature of a cash reserve and your credit is as high as the quantity and quality of the securities you can sell to liquidate our loans. We commercial banks cannot help you sell these securities but we can be of great help in giving you plenty of elbow room in the timing of your financing.

Harold H. Young, partner, Eastman Dillon Union Securities & Co.—

I wish I could say the outlook for permanent financing of your large capital needs in the next decade promises to be routine and automatic. Unfortunately, I think it may require application to the task at hand, ingenuity and statesmanship.

I see two primary problems, neither of which is insurmountable. One is that many electric companies have already done so much financing that some buyers have as much of their paper as they really want. This difficulty is particularly acute as to the big companies, some of which are already paying more for their capital than their credit warrants because buyers will take additional offerings only at price concessions. One suggestion to the larger companies is that they might consider coming to the market more often for smaller bites.

A second problem is the intense competition for funds from real estate mortgages, securities of other types of corporations and tax-exempt bonds of governmental bodies. Rivalry from the latter source promises to continue particularly strong in the years ahead as explosive population increases entail the financing of public works expansions of all kinds.

Fred W. Page, vice president, Tri-Continental Corp.—

How can you obtain a growth in earnings when your rate of return is restricted by regulation, and why should you be interested in a high price-earnings ratio for your stock, are natural questions to be asked.

Since premiums are produced mainly by high price-earnings ratios, you should continuously strive for a maximum ratio for your stock. And, of course, the greatest single contributor to the price-earnings ratio is the rate of growth in per share earnings. It can be seen then that one feeds on the other. Both stock dividends and rights offerings tend to conceal or delute your earnings record and so adversely affect your price-earnings ratio and the premium you obtain on the sale of common. These are the main reasons I would recommend against the use of either stock dividends or rights except under special circumstances.

Geo. T. Conklin, Jr., senior vice-president, Guardian Life Insurance Co. of America—

Your industry will be able to finance its needs in the period ahead, and without excessive difficulty, for undoubtedly it will remain the highest quality investment medium in the sixties as it has been in the fifties. The only question will be on what terms and at what rates. In an environment of economic growth and prosperity such as your figures for capital demands imply, it is my feeling that as your requirements become greater, and as the "trapped" and "unsophisticated" market which your industry now enjoys for your bonds become less "trapped" and more seasoned, the interest rates on electric utility bonds relative to other fields of investment will rise, and more protection against refunding will be accorded investors in electric utility bonds. These developments will make the electric utility bond market a more integral part of the entire bond market, rather than a rather isolated compartment in that market, and this will bring back the interest of other investors who now find greener fields elsewhere.

In summary, Moderator Scaff drew these conclusions:

The panelists reminded us that there were things that the companies could and should do to help assure that the funds will be available to them to provide the facilities that will be required to meet the demands for additional power. We were reminded that unfunded property additions are equivalent to a cash reserve in determining credit for bank loans. It was suggested that you come to the market more frequently for smaller amounts of money. You should be flexible to take advantage of the changes in the desires of buyers of bonds. Now may be an opportune time to sell preferred stock since the change in the tax laws has provided insurance companies with an inducement to buy such stocks.

The opinion was expressed that more might be done with convertible securities—notably debentures or preferred stocks. The necessity for keeping earnings and dividends up was stressed. In today's markets, stocks with growth in per share earnings are the ones that are attracting the investor's savings.

A reputation for growth in earnings is something that is not easily earned; it requires continuing effort over long periods of years. Do not hesitate to go to your regulatory commission if required to keep up your earnings.

The significant observation was made that the relative demands of the various sectors of our economy for capital are constantly changing and so is the relative attractiveness of these fields to investors. This is aptly illustrated by the actions of the life insurance companies in recent years in shifting away from electric utility bonds to mortgages and industrial bonds.

In conclusion, let us carefully weigh and consider the views and suggestions of these financial authorities and benefit from them to the fullest extent possible. In this way the electric utilities can be of great assistance to the financial community in helping them obtain the funds that will be required to provide the power needs of the sixties.

PG&E Gets New Isolated Phase Bus

General Electric's new isolated phase bus has been shipped to Pacific Gas & Electric for use in the Pittsburgh station. Designed to reduce losses produced by circulating currents, the new bus utilizes a recently developed method of shielding. By connecting together the ends of the three-phase bus enclosures, the external flux is reduced by as much as 90 percent over that existing in standard isolated phase bus. It is known that current flowing in one direction in a conductor and the opposite direction in its enclosures (a co-axial cable) can result in essentially no external flux. In addition to connecting ends of the enclosures together, proper proportioning of enclosure diameter and thickness so the current induced in the enclosure can flow in a closed circuit, is necessary.

Furnished to PG&E as a self-cooled pressurized unit, the bus is also available with forced-cooling or for 105 F high-temperature operation.

Aluminum U. G. Cable for Lighting

First installation of aluminum cable for highway interchange lighting in Wisconsin has recently been completed along U.S. Highway 141 a few miles north of Milwaukee. State Highway Commission specifications allowed the use of either aluminum or copper cable. A price comparison revealed a 22 percent cost savings over copper cable. A total of 116,000 ft of stranded U.S.E. cable in sizes ranging from No. 6 to 1/10 were installed.

The cable, supplied by Kaiser Aluminum & Chemical Sales, Inc., is direct buried. An additional 7,000 ft of aluminum duplex is used in a temporary overhead section. Nearly 300 mercury vapor luminares are served by the new circuit.

Develops Hot Cracking Test

A metallurgical test to quickly discover hot cracking in stainless steels and other alloys, has been developed by Westinghouse research laboratories. Test samples less than one ounce in weight accurately forecast this behavior susceptibility of metal structures weighing many tons.

In six months of research, the inventor, Dr. F. C. Hull, studied hot cracking in more than 800 samples of alloys, using only 40 pounds of metal. The test—named "cast pin tear" (CPT)—is based upon the fact that the tearing of a metal casting as it cools and shrinks from a liquid into a solid is comparable to the cracking of a weld as it freezes. Therefore, the study of small metal castings for hot cracking susceptibility is equivalent to the study of welds in very large samples of the metal.

Idea Pool Could Save $

Arizona Public Service and nine other utilities, coordinated by Ebasco Services, Inc. are participating in a two-year program for exchanging ideas on new equipment and methods for the construction and operation of electric distribution systems.

Specific objects of the program include promoting: (1) Increased productivity through further mechanization to reduce costs; (2) More effective use of experienced employees for construction, operation and maintenance of lines; (3) Development of an improvement in line construction and maintenance, methods and equipment; (4) Improved practices and methods to reduce capital and maintenance expenditures; (5) Adequate manning of crews and equipment; (6) A comparison of construction practices and efficiency between the ten utilities.

Taking part in the study are: Texas Electric Service, Southern California Edison, Louisiana Power and Light, Duke Power, Carolina Power and Light, Baltimore Gas and Electric, West Penn Power, Dayton Power and Light, Public Service of Colorado and Arizona Public Service.

First reports scheduled for distribution are on subjects of tree trimming and removal, temporary protective work grounds, dielectric tests of insulation coverings, and working baskets on elbow boom type trucks, street lighting and small mobile transformer trailers.

Install Big Breaker For Project EHV

A three-phase, 115-kv, air-blast, circuit breaker was recently installed at General Electric's Project EHV North Substation in less than seven hours working time from rail siding to complete assembly on its foundation. A crew of five men took three hours to unload, uncrate and transport the breaker from flatcar to site. The trip included a seven-mile truck ride over rugged snow-banked country roads in near zero weather.

LIGHT HELICOPTER VERSATILE UTILITY TOOL

Now used as a standard tool by several electric utilities, the light helicopter appears ready to emerge in the 1960's as one of the industry's important allies in the fight to hold operational costs in line.

Today more and more utility organizations are removing the experimental wrappings and putting the helicopter to work as everyday equipment which has been proved on the basis of hard economic data. The fact that a few utilities which pioneered the field are reporting highly profitable utilizations while many others have not even begun helicopter programs points up the growth potential of the decade ahead.

This report, which is based on a study conducted by the Hiller Aircraft Corp., Palo Alto, Cal., deals principally with the light, three-place helicopter which has a useful load capacity of about 1000 pounds, and is now being used by a number of utility firms.

Who's Using Them Now?

Southern California Edison became the nation's first privately-owned utility to own and operate a helicopter when it purchased a three-place, 305-hp Hiller 12E recently. The company made the move after proving the profitability of helicopter methods through extensive chartering of helicopter time from commercial helicopter operators. Chartered time in 1959, totalling more than 850 hours, included flights chartered directly by the company and by construction firms working on Edison projects. In the vast majority of jobs, the helicopter operations proved highly successful, according to F. R. Payne, who administers the company's aviation activities.*

Pacific Gas and Electric recognizes the helicopter as a profitable tool in no less than five of its operations. This company charters some 30 helicopter flight hours each month on the average, and continues to explore new uses.

Helicopter line patrol, which covers from 30 to 50 line-miles per hour compared with an average of 10 miles a day by foot, is the most universally-accepted of all heli-

**Southern California Edison has announced it will, as a matter of policy, make available to all interested parties data it accumulates as it progresses with its helicopter development program.*

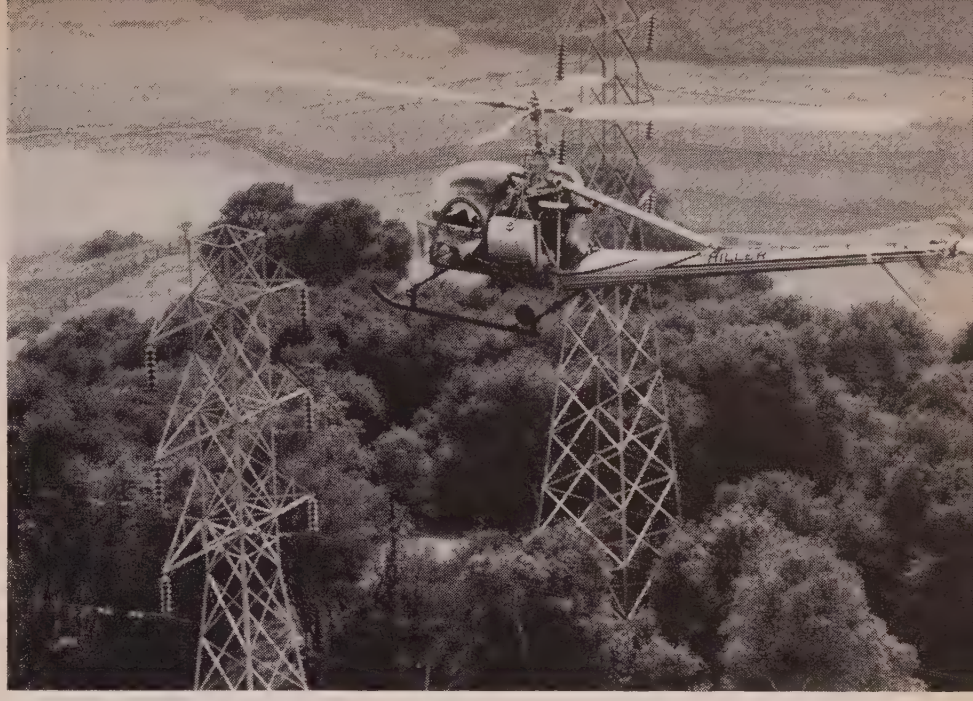
copter applications within the industry. Regular helicopter line patrols are flown by Southern California Edison, PG&E and a number of other utilities including Public Service Company of Colorado, Philadelphia Electric Company, Washington Water Power Company, Philadelphia Electric Company, Los Angeles Department of Water and Power, Bonneville Power Administration and TVA.

Cost Savings Are Impressive

As one example of savings, Philadelphia Electric accomplished the patrol of 440 line-miles of single- and double-circuit 33-kv and 220-kv lines by chartered helicopter in 14 to 15 hours. Ground patrol previously required 37 man-days. The helicopter released two trained linemen for other duties and reduced the cost of each complete patrol by more than $200.

A Hiller 12E helicopter chartered by the Public Service Company of Colorado has eliminated the need for full-time foot patrol of a 115-kv transmission line at the 13,500-ft level over Argentine Pass in the Rocky Mountains.

The helicopter has been called in repeatedly to string line, shuttle personnel and equipment, and even set poles and haul in the steel for transmission-tower construction. With growing use, improved techniques have been developed to increase the helicopter's productivity. Depending upon the peculiar circumstances of the individual job, cost savings often are figured in thousands of dollars.



One of the most common utility uses for light helicopters . . . power-line patrol. Note the auxiliary fuel tank (on side of Lycoming engine) which can extend range to six hours.

Up and away! A 40-ft power pole airborne to pre-dug post hole. Project: Complete power-line relocation, Shoshone Canyon, Wyo.

Southern Cal Edison's Program

As administrator of Southern California Edison's aircraft activities, F. R. Payne probably holds operational reports on more helicopter operations within the utility industry than any other man. The company has used chartered services increasingly in its race to keep up with the rising demands for energy in Southern California since World War II. In that period, the company's system investment has exceeded a billion dollars. In 1959 alone, the company's construction budget was $110-million.

Because much of its line construction is in rugged, inaccessible terrain, Edison's construction projects—along with those of PG&E—have become the "proving ground" for helicopter construction support. Moreover, the company conducts regular helicopter patrol of 4800 line-miles of transmission lines in ten Southern California counties. The distribution system totals about 110,000 more miles of line.

"Our approach to helicopters has been cautious," Payne says. "We call an application operational only after it has proved itself. The com-

pany justified purchase of its own Hiller helicopter on the basis of the growing number of proven applications."

Though generally satisfied with results to date, Payne and Southern California Edison are not yet satisfied with research to date. "Our own experimental and development work has been most productive," Payne says, "but we feel there has been too little of it. We think the utility industry is hardly scratching the surface of the potential savings and efficiencies which helicopter methods now make possible."

The secret in helicopter profitability is proper application, Payne believes. In addition to increasing use of proven profitable utilization, he foresees considerable growth in the list of jobs which the helicopter can profitably perform for utilities. He said this was one factor leading to the company's decision to buy its own helicopter.

"We hope to find time to explore new applications and possibilities," Payne says. "In particular, we feel the constantly-available helicopter can be effectively used in both maintenance and personnel emergencies, for outages of various types, repair of towers, microwave station servicing and in construction, telemetric-type survey work, and even courier work and executive transportation in situations where time or inaccessibility are factors. We'll also use it for fire patrol and forest-fire fighting duties along our line routes."

Much utility company helicopter work to date has begun in mountainous, hard-to-get-to areas. From successes here, some applications—power line patrol and line-stringing in construction—have proved profitable and become widely accepted in any type of terrain. But helicopter time does not come cheap—whether purchased from an operator or whether a company operates its own helicopter. It remains a specialized tool.

"The helicopter cannot compete with a truck," Payne says, "where accessibility is no problem. But where much area must be covered in short time, where hard-to-reach spots must be reached or even become work centers, and where time is a factor, the helicopter deserves serious consideration."

Six Major Copter Applications

Economically-proven applications of light helicopters in the utility industry fall roughly into six major categories . . . all proved by actual utility work, and which may hold important potential for the entire electric power industry.

1. *Power-Line Patrol*

Power-line patrol was logically the first job assigned to helicopters by utilities. Their unique operational features are ideally suited for this work. Able to take off or land on small unprepared areas and hover for detailed observation a few feet from the ground, the helicopter is not affected by difficulties which mountains and forest pose to trucks, jeeps, bulldozers or fixed-wing planes.

Most utilities now using helicopters for power-line patrol employed the machine initially for emergency situations where washouts or other damage made ground patrol impossible. From this experience, they learned that the helicopter saves money when used routinely for preventive maintenance and inspection for such common damage as broken conductors, broken insulators, broken insulator strings, bent or broken steel, split wood pole crossarms, dangerous

Wirestringing, by helicopter on the Shoshone Canyon project in Wyoming. Insert closeup shows pulling line of light rope being draped across pole structure.

Snow survey for PG&E in California's Sierra Nevada mountains.

trees or encroachments of dense, high brush.

Patrol usually is conducted at from 25 to 40 or even 50 miles per hour. Normally, the helicopter flies 30 to 40 feet to one side and about 25 feet above a line. When anything suspicious is spotted, the copter may either hover below and to one side of the transmission line tower for a closer look or actually land for closer scrutiny.

It is impossible, of course, to estimate the dollar value of efficient, preventive maintenance which catches trouble before it occurs. But, almost without exception, utilities have found that the helicopter saves money in the doing of the job —as well as in doing it better.

Southern California Edison reports elimination of 92 percent of its ground patrols in rural areas through the use of the helicopter. Patrols cost 20 percent less. Similar savings have been recorded by PG&E and Philadelphia Electric, cited earlier.

At Public Service Company of Colorado, it was a case of the helicopter doing a job—over Argentine Pass—that never had been possible before except by laborious foot patrol. A Hiller 12E, most powerful in its class, brought a new high-altitude performance capability to the helicopter operating industry. Chartered to make a once-a-month patrol of some 600 miles of transmission line, it is doing the job in two days. Much of the terrain is some of the most rugged in America, but the company finds the helicopter equally profitable on flat, prairie stretches.

The Los Angeles Department of Water and Power has been able to pare down ground patrol crews through routine use of the helicopter. Two patrol headquarters on the Hoover lines, where buildings were rented and men were kept on duty at all times, were closed after helicopters were chartered. The Department feels that the helicopter patrol is superior to ground patrol in locating insulators marked by flashovers and detecting damage to tower structures or overhead ground wires. It believes foot patrol remains superior for observation of counterpoise gaps and tower anchorages, but it has been able to reduce the scope of ground patrol by regular use of the helicopter. Savings annually are in excess of the cost of the chartered helicopter service.

Most utilities using helicopters favor regular monthly patrol. PG&E, with 70,000 miles of transmission and distribution lines, usually patrols the entire system by helicopter during the spring and again during the fall. In the interim, helicopters are chartered as situations dictate.

2. *Line-Stringing*

Line-stringing by helicopter first began in inaccessible mountainous areas and, with refinement of techniques, since has proved profitable even on straight and level stretches. F. R. Payne of Southern California Edison relates the accepted way of stringing transmission and distribution lines by most contractors in the West.

The helicopter usually lays "pulling" or "sock" lines of light rope draped over the towers. This is placed in the sheaves attached to heavier cable or to the electrical conductor itself and pulled through. Southern California Edison has found the cost of using a helicopter to vary between $12 and $18 a line mile to lay the fly line.

Just as important, the helicopter can lay a mile of line in minutes. Often this technique speeds up a construction project—especially in rugged areas where roadbuilding would be both impractical and expensive. Also, this method requires less inconvenience to adjacent land owners. The helicopter method is dependable, reducing the chance for error such as when using line guns to "shoot" line across ravines and over heavily-wooded terrain.

The technique for line-stringing may vary depending upon the weight of the line to be strung, natural conditions encountered, and even the helicopter doing the job. Usually, the line is played out through a hole in the back of a cannister which spins line off a spool housed inside. Sometimes, line is fed from a special tray. The line is laid directly across the towers, or poles, sometimes on the ground, depending upon the type of line and the local terrain.

Successful line-stringing examples are plentiful in the West. A recent project, contracted by the

A. S. Schulman Electric Company of California for Southern California Edison, involved the laying of seven "sock" lines across yawning canyons and deep ravines in the rugged Santa Susanna Mountains north of Los Angeles. Finished in a single day by helicopter, the job would have taken days longer to shoot with a rope gun and to drag lines across the deep ravines with a tractor. In this case, only the top "ground wire" was laid directly across the towers by helicopter.

Six "socks" were first laid on the ground, which was relatively free of timber and brush, and then placed in pulling sheaves and used to pull a light ¼-in. steel airplane cable into place. The airplane cable, in turn, was the final sock which pulled in the 1,000,000-cm conductor. Average flying time for laying out 3000 feet of rope (one reel) was six minutes. The helicopter contractor charged $120 an hour.

The 1,033,500-cm ACSR was strung under a tension of 8000 pounds using Pengo tension machines, pulling machines and reel winders. It was pre-stretched to approximately 14,000 pounds and then sagged at about 9000 pounds. Six conductors were strung (three on each side of the tower), as well as the one overhead ground wire.

PG&E cut costs in half and saved at least two weeks in time by utilizing a helicopter to place some 4000 feet of line to a pumping station atop a mountain in the rugged area near Mt. Tamalpais in Marin County across the Golden Gate Bridge north of San Francisco. The line crossed two 800-ft deep canyons choked with undergrowth.

Two stretches between poles extended 1600 feet. The area was inaccessible and the growth so dense that, while it might have been desirable to place poles closer together, the placement described was decided on rather than to try to set extra poles. "Pulling" lines were laid by helicopter directly across pole cross members and then placed in pulleys by pole skinners.

Clearing brush alone would have taken two weeks. In addition to avoiding arduous clearing, the helicopter topped off the work in a single day.

3. *Right-of-Way Survey*

Several utilities, notably Southern California Edison, have found the helicopter highly practical for right-of-way survey work. Its ability to cruise slowly, to hover, to move backward or forward from side to side over a small area is equally valuable when investigating or choosing new rights-of-way.

4. *Snow Survey*

In the West, both Southern California Edison and PG&E have made extensive use of the helicopter to make surveys of depth and moisture content of snow which falls during the winter on their respective watersheds. This will be one of the first big, continuous jobs for Southern California Edison's own Hiller 12E—a helicopter noted for superior performance at high altitudes.

Before employment of helicopter methods, both these companies maintained "ski patrols" through the winter. Hydrographers made slow, somewhat hazardous ski trips into the upper mountain slopes to conduct their work.

Now both firms accomplish the mission in a fraction of the time by flying hydrographers into check stations with ski-equipped helicopters. PG&E performs what was once full-time work by running a "snow course" between the 25th of one month and the 5th of the next. Southern California Edison uses a "leap frog" technique whereby its helicopter spots two hydrographers at one test spot, flies two more to the next, then goes back to pick up the first two. The system has reduced from 11 to two days the time it takes to accumulate readings from a 100-mile circular route. The route is divided into 13 courses with ten to 38 samplings per course.

5. *Power-Line Construction Support*

In addition to line-stringing, helicopters have been used with increasing success for heavier construction work. Recently, the Bureau of Reclamation called on a Hiller 12E light utility helicopter when new highway construction forced the relocation of a power line west of Cody, Wyoming. Located in terrain bearing the appropriate names of Rattlesnake Mountain and Shoshone Canyon, the midwinter job threatened a lengthy disruption of electric service.

The contracting firm called on a Cody, Wyoming helicopter operator, who had only recently taken delivery of the more powerful Hiller ship. Operating above the 5000 foot level, the aircraft with more than 1000-lb useful load capacity successfully placed 40-ft poles in pre-dug holes, toted massive cable spindles, laid wire, and, not incidentally, reassured a construction crew constantly faced with possible injury on hazardous, icy footing that help was always overhead.

The entire line was moved in an absolute minimum of time, prompting a vice-president of the contracting firm to say the helicopter and the pilot, " . . . have done more in three hours than we could do with two 6-man crews in a week."

Southern California Edison successfully used the helicopter as the prime cargo hauler, for instance, for heavy steel and all materials needed to construct five line miles of a 220-kv line near Saugus, California. A heavy helicopter carried in the bundles of steel used to build 15 towers as well as concrete footing materials. Two lighter machines ferried men and tools and small steel forming materials to construction sites.

PG&E set 58 poles by helicopter in the mountains near Santa Barbara—and supported it with two smaller helicopters used for line-stringing, personnel shuttle, and carrying smaller materials.

A growing use of the helicopter in a cargo capacity is to support small boondock construction projects. Southern California Edison successfully used light helicopters to carry a 15,000-lb prefabricated cabin seven miles from base camp to a construction site at the 11,000-ft level in the High Sierras near Big Creek, California. Prefabricated sections were carried up in full-lengths so that all the workmen had to do at the site was erect the sections.

PG&E has used chartered helicopters for numerous back-country projects, delivering cement, lumber and flume material into out-of-the-way localities on its water sheds. In one instance, a 9-by-9-ft prefabricated "Porta House" tool shed was moved by truck to a meadow as close as possible to an ultimate mountain site. A helicopter lifted half the tool shed directly from the truck to the erection site. A second lift completed the hauling of the

1000-lb tool shed. The prefabricated structure was set up by two men in just 40 minutes. The complete operation took less than an hour.

6. *Right-of-Way Spraying*

One of the newest—and most promising—helicopter applications is in the control of growth along power-line rights-of-way. In almost every area of the United States, brush and weeds pose a problem. They can cause troubles of their own if allowed to flourish and may effectively produce outages by delaying access to areas needing attention. Where wood transmission-line poles are used, seasonal fires of weeds and marsh grass may endanger poles unless protective means are used.

PG&E successfully proved the profitability of helicopter spraying in 1958 in an experiment covering 300 acres of brush-infested right-of-way. The kill was successful and the cost was but a fraction of that incurred using ground methods. Precise chemical application, made possible by using helicopters, held "drift" and the possibility of subsequent claims from neighboring land-owners to a minimum. It is impossible to do the same job by airplane with similarly impressive control.

One helicopter can spray as much, often more, in a single hour than a ground crew with power equipment can spray in a day. Using a specially-formulated herbicide, the helicopter sprays at an average speed of 30 mph. At 15 mph, a helicopter's rotor forces approximately two million cu ft of air per minute down to the vegetation. Since spray-boom nozzles are directly below the rotor, this serves to "beat in" the chemical being applied.

While the foregoing six applications are the most commonly used and best-proven helicopter jobs within the utility industry today, they are by no means the only ones. Several utilities have successfully "de-iced" transmission lines by simple dislodging snow and ice with the rotor downblast, and/or by dragging a bamboo pole over the lines. Emergency maintenance crews are flown into hard-to-get-to areas. Several utilities are finding they can save time when it counts by using helicopters to transport rushed executives safely and swiftly above traffic-congested streets below.

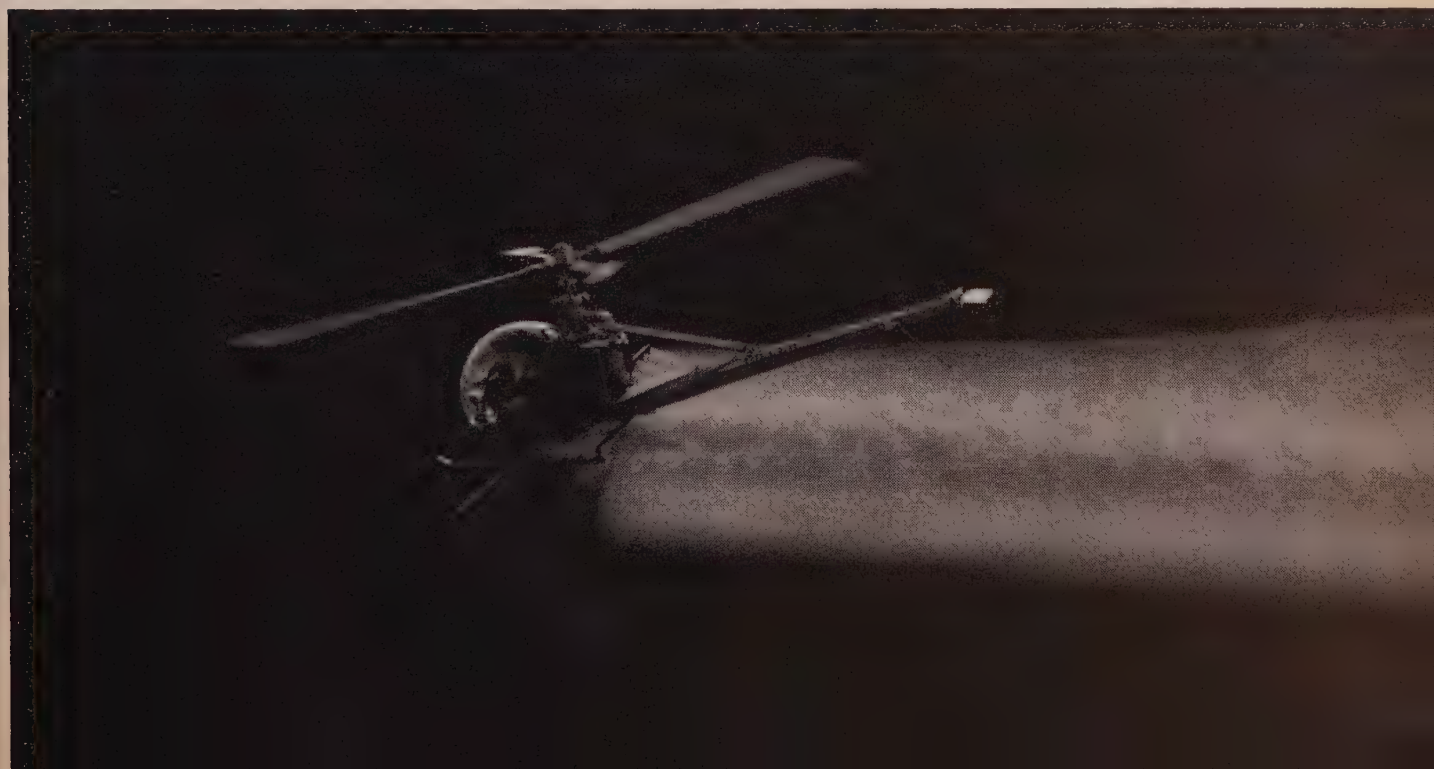
A Look At The Copter's Future

The men who have applied time and creativity to the successful application of helicopters in utility work believe the potential uses yet undemonstrated may become as important as the now-proven missions.

In the final analysis, widespread use of helicopters will undoubtedly be achieved as utility organizations —one by one—learn to examine realistically the *over-all* costs incurred by each utility mission or combination of missions, as accomplished by a helicopter versus all other possible methods. Just as today's helicopters are somewhat complicated instruments, so are the criteria for evaluating their "economic effectiveness," even in many cases where the advantage is great. This "helicopter business education" problem is today the major obstacle in the path of radically expanded industrial helicopter utilization.

Looking beyond the immediate future, utility men see new promise in helicopter equipment now on the drawing boards of rotary wing manufacturers. When practical turbine engines for light helicopters become operational, helicopter simplicity, performance, and versatility will be progressively improved. Large helicopters, which now pay large penalties for complexity, will be simplified radically by such concepts as the Hiller Tip Turbo helicopter which eliminates huge transmissions and gear trains by placing jet power in the tips of the rotor blades. Ultimately, large and small helicopters can work together to accomplish an entire spectrum of utility jobs.

Right-of-way spraying is more effective with helicopters for two reasons . . . greater coverage and speed plus the rotor that envelops growth with herbicide.



ECONOMIES OF GAS TURBINE FOR PEAKING

Authors study model electric utility system to ascertain economics of adding gas-turbine peaking capacity and deferring installation of additional base-load capacity over both short and long terms; net savings result in each of three time cycles studied.

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ECONOMICS of special purpose plants for supplying peak loads has received considerable attention for the past few years.(1) Use of these plants represents a deviation from long established patterns of expanding generation by addition of efficient base load plants. This places additional burden on engineers making such evaluation because much of the intuitive judgment developed for conventional plants is not applicable. Extreme care is necessary in evaluating this alternate method of generation expansion to be sure that all capital, production, and operating costs and benefits, both present and future, are properly included. An analysis must also include cost differences reflected in all other plants in the system and in the intervening transmission and distribution system. In short, evaluation of peaking plants is one of the most complex economic problems which has faced the industry to date.

Editor's Note—This is an abstract of a paper presented by the authors at the 1960 American Power Conference.

TABLE I

PRESENT INSTALLED CAPACITY OF MODEL SYSTEM

Unit No.	Net MW Capacity	Full Load Production Cost, Mills/KWH
1	25	4.25
2	25	4.25
3	40	3.80
4	40	3.80
5	40	3.70
6	60	3.40
7	60	3.40
8	60	3.20
9	100	2.70
10	100	2.60
11	100	2.60
12	150	2.25
13	150	2.25
14	150	2.20

Several excellent papers have recently described generalized approaches to the problem. These are very valuable during formative years when the industry is searching diligently for a pattern to develop in this peaking problem. The authors, however, have felt the need for more detailed studies on specific systems to supplement the generalized studies. This is particularly important in the peaking problem since the optimum economic solution is so closely keyed to the characteristics of the particular system being studied.

With this in mind the authors have performed an economic evaluation of the integration of 22,000-kw gas turbines into the expansion program of a specific model electric utility system. The study was further restricted to determining merely whether the first block of gas turbine capacity can be economically justified. The gas turbine was assumed to go into a central station location and no advantage has been taken of decentralization and resulting transmission saving.

Results of this evaluation are presented in some detail with the hope that it will sharpen perception of the economic significance of some of the more important variables, and encourage others to present more detailed studies which they have performed.

Procedure Adopted

Procedure adopted for this evaluation was, first, to define characteristics of the model electric utility system; present loads, installed generation, production costs, future load growth trends, and a criterion for installed reserve.

A base expansion pattern was developed for the next 12 years with new generation requirements being met by a sequence of base load steam units. A peaking pattern was developed with the first unit being a block of gas turbine capacity. This

was followed by the same sequence of conventional units as in the base plan.

Capital requirements and annual production costs for each of the 12 years were established for both the base and peaking plans. Comparison of costs for the two plans permits evaluating whether the first block of gas turbine capacity can be economically incorporated.

Description of Model System

A tabulation of units presently installed on the system, along with the full load production costs, is given in Table I. At time zero, when the first new block of capacity is required, system peak load is 1000-mw. For future years, system peak load increases at a uniform 50-mw per year.

The percent load duration curve is shown in Fig. 1. The shape of the curve remains fixed in future years. This curve represents a system load factor of 60 percent.

The following criterion was established for unit addition: A minimum of 10 percent installed reserve must be maintained above system peak load. While the criterion makes no specific allowance for statistical variation of monthly peak load within a calendar year, this was accomplished in the selection of expansion plans. Capacity steps were selected which, combined with the above criterion, resulted in all units in each plan going in the same calendar month. This permits an installed reserve pattern which is quite consistent between plans, but is also realistic.

Annual carrying charge rate was taken as 13 percent.

Development of Alternate Plans

Two long-range generation expansion plans were developed and are tabulated in Table II. The base plan is predicated upon continued expansion by addition of base load, high-efficiency steam units. Three 220-mw units will meet load growth over the next 12 years. Capital costs are based upon $150/kw net capacity. The required installation dates to meet the installed reserve criterion are developed in Fig. 2.

The peaking plan in Table II starts with initial installation of 55-mw of gas turbine capacity. This is followed by the same sequence of conventional steam units as the base

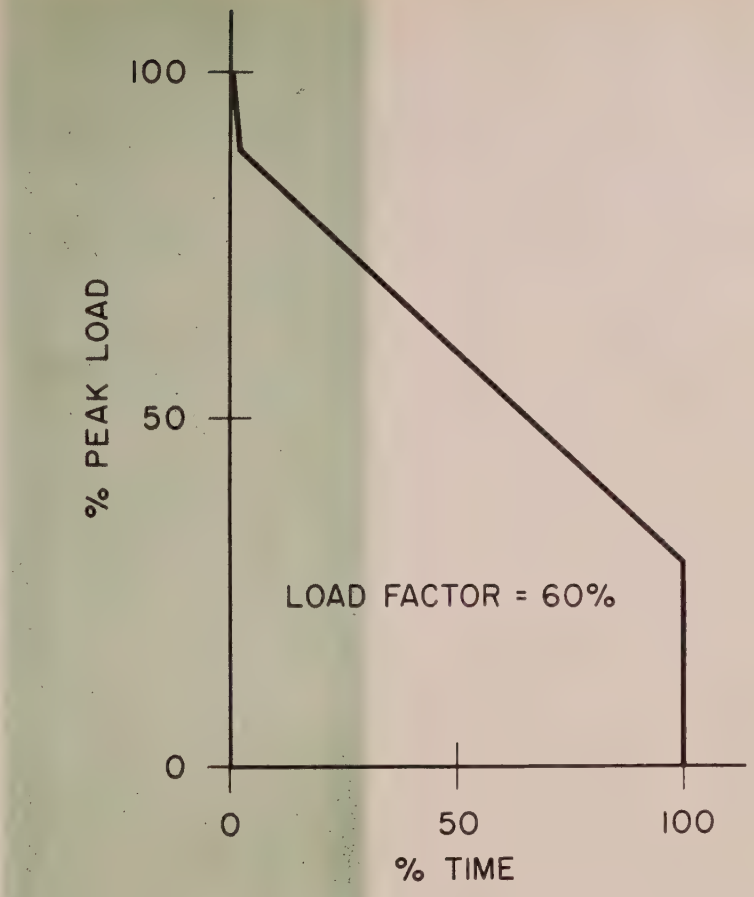


Fig. 1—Annual load duration curve used in study.

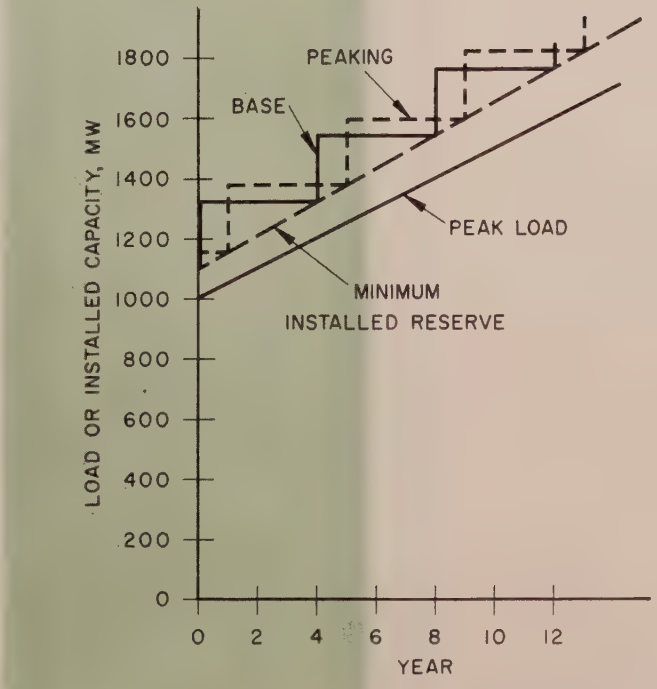


Fig. 2—Future load and capacity patterns for base and peaking plans.

TABLE II

FUTURE GENERATION EXPANSION PROGRAMS

BASE PLAN

Unit No.	Unit, Net	Date	Capital Cost	Full Load Production Cost, Mills/KWH
1	220 MW Steam	0	$33,000,000	2.05
2	220 MW Steam	4	33,000,000	2.05
3	220 MW Steam	8	33,000,000	2.00

PEAKING PLAN

1	55 Mw Gas Turbine*	0	$ 5,200,000	10.0 **
2	220 MW Steam	1	33,000,000	2.05
3	220 MW Steam	5	33,000,000	2.05
4	220 MW Steam	9	33,000,000	2.00

* Based on winter rating of two nominal 22 MW units.
** Based on use of No. 4 Distillate oil.

plan. Note that the costs listed for the gas turbine block are based on two peak rated 22-mw units. A 22-mw unit is capable of producing 27.5-mw at low ambient temperature. Assignment of a summer rating for installed capacity considerations and costs should be based on the lower plant rating. This evaluation is made later.

It is important to understand the influence of the initial installation of gas turbines on capacity requirements. Fig. 2 shows that the gas turbines result in one-year delay in the required date for not only the first, but also for the second and third base-load units. The gas turbines do not supplant base load units, but merely delay their purchase. It is in this delay of major capital expenditures that the gas turbine must find its economic justification.

Installed capital cost of the various plants is summarized in Table II. Timing of plant capital expenditures is shown in the upper curve in Fig. 3 for both the base and peaking plans. Because of the non-simultaneous pattern of expenditures, it is helpful to convert the lump-sum capital expenditures to a pattern of annual costs required to support the plant investments. This is done in the middle curve in Fig. 3.

For the base plan, the first 22-mw plant has a cost of $33 million which, at a carrying-charge rate of 13 percent, is equivalent to $4.29 million per year for all future years. This $4.29 million represents annual capital cost for the base plan for the first four years. Following the second 220-mw unit, annual cost runs $8.58 million through the next four years. From years eight through 12, annual cost is $12.89 million.

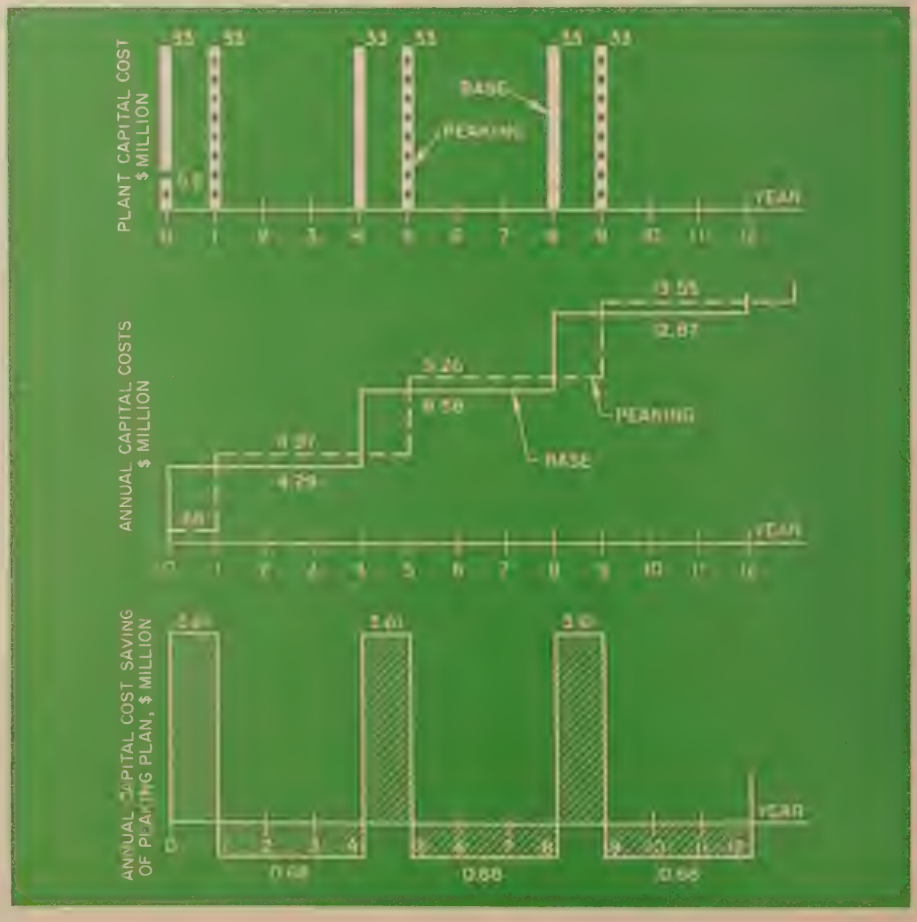
Gas turbine cost in the peaking plan is estimated at $5.2 million, or an annual cost of $0.68 million for the first year when the 220-mw unit has been delayed. The remainder of the annual capital-cost pattern is similar to the base plan except displaced horizontally by one year and vertically by $0.68 million.

Comparison of annual capital cost requirements for the two plans emphasizes the source of potential saving by integration of the gas turbine. For the first year, the base plan has annual capital cost of $4.29 million, while the peaking plan requires only $0.68 million, or a reduction of $3.61 million favoring the peaking plan. This is followed by three years in which the peaking plan carries a $0.68 million penalty since both plans now have the 220-mw unit installed, but the peaking plan must also carry the annual cost of the gas turbine. Difference in annual capital cost requirements is shown in the lower part of Fig. 3. lower part of Fig. 3.

Without resorting to present-worth arithmetic, it is obvious that the peaking plan results in lower capital requirements than the base plan for the four year period. Note that succeeding four-year intervals produce a cyclic pattern identical to the first four year period. So, capital charges associated with the peaking plan are less than with the base plan.

At this point it is interesting to speculate on influence of rate of

Fig. 3—Capital requirements of base and peaking plans.



system load growth. Suppose that load growth were twice as fast as previously assumed. The capital-cost pattern at the bottom of Fig. 3 would be repeated, but with times compressed by a factor of two. Average capital reduction per cycle would be halved, but there would be two cycles in the first four-year period instead of one. Average capital-cost saving would be the same over this interval, but present-worth saving would be somewhat less with faster load growth because savings are more nearly spread over the interval rather than being concentrated in the first year. Of course, this generalization cannot be carried too far because rate of load growth can have so many other influences such as permitting use of larger units, etc.

Production Costs

Another important cost difference between base and peaking plans is total annual system production cost. Using unit production costs in Tables I and II, total annual system production costs were calculated for both plans using the IBM 704 Production Cost Program described in Reference 2. The difference in production cost for the two plans is plotted in Fig. 4.

During each of the "delay" periods (when the gas turbine has deferred installation of a base load unit), a substantial production cost penalty is carried by the peaking plan. This penalty comes about from two causes: (1) because the gas turbine carries a certain number of kwh which otherwise could be carried by the efficient base load unit had it been installed: (2) because the base load unit was deferred, other less efficient units on the system are carrying more kwh.

It is important to note that of the total production cost penalty of the peaking plan, only two to three percent of this penalty is due to energy carried by the gas turbine. The remainder is due to failure to improve overall system heat rate by unloading other conventional but less efficient units by adding the new base load unit. This same result is borne out by a number of other studies which the authors have made for specific utility systems. For a unit installed for true peaking duty, production cost of that unit is of very little significance until a fairly high

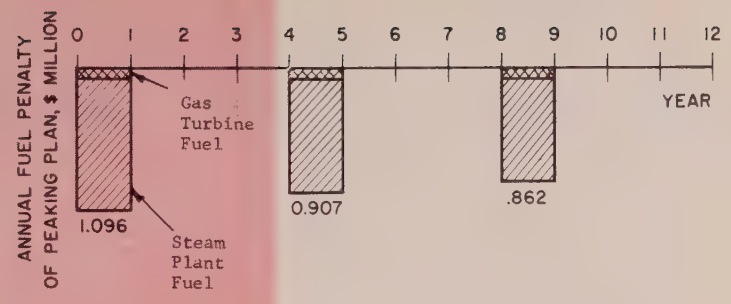


Fig. 4—Fuel cost penalty of base and peaking plans.

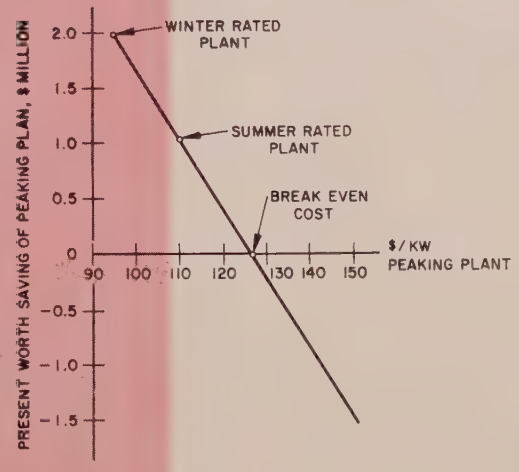


Fig. 5—Influence of peaking plant cost on evaluation of peaking vs base plan.

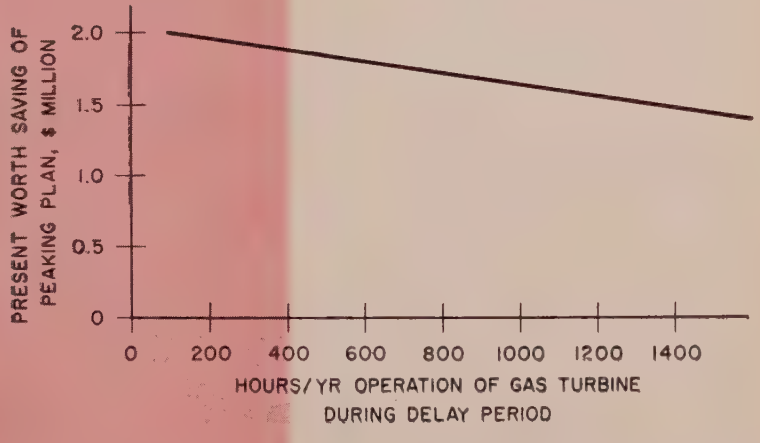


Fig. 6—Influence of excessive hours operation of gas turbine which might be required during "delay" periods.

degree of saturation has been reached.

Note that no production-cost penalty occurs in any years except the "delay" periods. In other years the same conventional steam capacity is installed in both plans. If the base plan has enough conventional capacity to meet the load, the peaking plan would also and there is no requirement to run the gas turbine. In actual practice, the gas turbine probably would be run in these intermediate periods because of its flexibility and fast start-up. However, this should only be done if economics or substantial operating benefits accrue, in which case a positive credit rather than a penalty should be assigned to the peaking plan. No attempt was made to assign a dollar sign to operating flexibility for this study.

Fig. 4 shows that fuel-cost penalty decreases for succeeding "delay" periods. As more high-efficiency units are added, incremental improvement in system heat rate becomes less with each new addition. Fig. 4 is a numerical example of generally-accepted philosophy that special-purpose peaking units can be better justified on systems which are highly saturated with high-efficiency units.

Capital Saving and Production Penalty

Fig. 4 and the lower curve in Fig. 3 permit direct comparison of capital-cost savings and production-cost penalty for peaking and base plans. On a short term basis, the peaking plan looks attractive because it permits a year delay in substantial financial requirements without incurring excessive penalty in years immediately following.

For long range economic evaluation, a present-worth analysis of future annual capital and production requirements is necessary. A summary of present-worth comparison of base and peaking plans for the 12-year period is given in Table III. This shows that present-worth of fuel and production requirements for the peaking plan is $1.98 million less than the base plan, and that the peaking plan is also more attractive in the long term.

Review of the present-worth analysis shows that a net saving develops over each of the three cycles and, further, that savings will also result beyond year 12. The significance of this is that after year 12 there is not a hidden deficit in the peaking plan which would adversely affect selection of the gas turbine. In fact, extension of the study beyond year 12 would increase total present-worth savings in favor of the peaking plan.

Influence of Capital Cost

The previous analysis is based on gas turbine plant capital cost of $95/kw which corresponds to a winter-rated plant. A summer-rated plant might run in the order of $110/kw. Fig. 5 shows the influence on present-worth savings with variation in capital cost of the gas turbine plant. A summer-rated plant at $110/kw still results in substantial saving, with break even cost being $127/kw.

Influence of Increased Running Time

This analysis has been based upon operation of the gas turbine for the number of hours defined by the digital production cost program. This program utilizes unit availabilities, aligns outages in a prescribed fashion, and finally results in running time of gas turbines in the order of 100 hours per year during "delay" periods. Specific maintenance scheduling programs and forced outages could cause considerable realignment of availabilities, and longer or shorter running times for the gas turbine may result in any particular year.

Fig. 6 shows the influence on economics for various hours per year operation of the gas turbine. As pointed out previously, only running time during the "delay" periods should be included since only then is the gas turbine *required* to run. This curve shows that even for many hundreds of hours per year operation, the peaking plan still results in considerable saving.

Conclusion

Other factors which have a favorable bearing on economic selection have not been included in this analysis. Operating flexibility and low start-up cost of the gas turbine would provide additional operating economy by using this plant for meeting daily peaks to displace old steam units with high maintenance costs. It might permit converting an older plant to standby operation, or cut from seven-day to five-day manning of the plant.

The peaking plant could be lo-

(Continued on page 125)

TABLE III

PRESENT-WORTH COMPARISON OF PEAKING PLAN WITH BASE PLAN

	Saving, and Million	P.W.F.		P.W. Saving, and Million
CAPITAL	4.29	1.000		4.29
	4.29	.792		3.40
	4.29	.627		2.69
	—0.68	8.89		—6.04
			Total	4.34
PRODUCTION	—1.096	1.000		—1.096
	— .907	.792		— .719
	— .862	.627		— .540
				—2.355
NET	Capital Saving	4.34		
	Fuel Deficit	2.36		
	Net Saving Peaking Plan	=	$1.98 Million	

NSP'S "GALLOPING TESTER" PROVES SUSPENSION INSULATORS ARE RUGGED!

By JOHN C. SLOTHOWER
Assistant Superintendent,
Transmission and Distribution
Northern States Power Company
Minneapolis, Minnesota

Duplication of insulator string action in uplift and vibration under laboratory conditions reveals no positive correlation between cotter-key pull-out force or ball-bolt diameter and the tendency to come uncoupled.

A SERIES OF TESTS with a specially designed machine has proved to Northern States Power Co. that the modern suspension insulator is extremely rugged and will withstand severe mechanical duty far beyond that for which it is designed.

The machine duplicates the most severe mechanical duty a suspension insulator may be expected to withstand—a "galloping conductor" condition. It gives a violent bouncing action to an insulator string, similar to "galloping" conditions, or to an exaggerated degree, that which may occur to any string in uplift under even very mild transverse winds. See Fig. 1 (next page).

Though suspension-type transmission lines are specifically designed to avoid uplift, it can still occur.

The company had several cases of ball-and-socket strings coming uncoupled in service. The involved strings were on single-pole transmission lines with short spans and relatively high conductor tensions. On this type line, the total of the allowable errors in original surveying, the line layout, and the pole setting, if cumulative, can be of the same order of magnitude as conductor sag. Likewise, later shifting of poles due to unequal frost action, soil movement, or some other action can throw the insulator strings on one side into uplift. It was thus felt desirable to duplicate insulator string action in uplift and vibration in the laboratory.

What Causes Uncoupling?

Preliminary investigation indicated that some of the factors which might affect the tendency of a ball-and-socket insulator to come uncoupled were:

1. Force required to pull the cotter key from its hole in the back of the socket. This is a function of cotter key shape and hardness as well as the size and smoothness of the hole.

2. Relative sizes of the ball and socket at each mating joint. This is principally a function of the quality control of each manufacturer since average size and maximums and minimums are specified in the EEI-NEMA standards.

3. Exact shape of the ball-bolt and of the socket. While all manufacturers comply with the EEI-NEMA standards, there is still appreciable variation in the detailed design of the socket and, to a lesser extent, the ball-bolt.

Some of the units which had come uncoupled in the field had cotter keys which required only 17 lb pull to back them out over the "hump." Other units checked in the laboratory required well over 100 lb to pull the cotter keys over the "hump." Units with the extremely low pull-out force could be made to uncouple very easily by merely "jiggling" them by hand for a few minutes, the cotter keys backing out quite readily. These facts led to the belief or theory that the tendency to uncouple could be directly related to the above items—especially Nos. 1 and 2.

The tests were conducted on 138 EEI-NEMA Class 57-3 ball-and-socket suspension insulators of the 15,000-lb class. Insulators from eight

VIBRATION TEST RESULTS

Insulator Units Which Came Uncoupled

Unit	Mating* Ball-Bolt Diam.—In.	Avg. Cotter-Key Pull-Out Force—Lbs.**	No. Of Cycles In Most Severe Position Before Uncoupling***
1	1.279	66	76
2	1.299	66	431
3	1.299	122	1,627
4	1.272	44	2,387
5	1.268	31	2,747
6	1.268	43	3,078
7	1.261	65	4,095
8	1.283	149	6,050
9	1.253	39	6,378
10	1.252	53	9,283
11	1.302	38	10,419
12	1.296	41	10,419
13	1.277	39	11,002
14	1.285	83	13,434

* Ball-bolt on unit immediately above this one during test.

** Average of six tests.

*** Most severe position is considered to be any one of the bottom three positions in the test string of nine units.

different manufacturers were tested. Each unit was first given a cotter key pull-out test and was also checked for ball-bolt size. The units were then put on the vibration tester and run for as long as 70,000 cycles at 20 cycles per minute.

Fourteen Units Uncouple

Of the 138 insulators tested, 14 came uncoupled during the tests. Contrary to our belief, there appeared to be no positive correlation between cotter-key pull-out force or ball-bolt diameter and the tendency to come uncoupled. Cotter key pull-out force on these 14 units ranged from 31 to 149 lb and the length of time before uncoupling ranged from 76 to 13,000 cycles with some units with large pull-out forces and large ball-bolt diameters coming uncoupled in the shortest times. (See Table.)

It is apparent that other factors more difficult to evaluate—such as the detailed design of the socket in the insulator cap and possibly small variations resulting from the forging or casting process—are critical in controlling the tendency to come uncoupled. The cotter key appears to exert some influence, but here again, the evidence is confusing.

In some units which were run for over 30,000 cycles without coming uncoupled, the cotter keys were smashed completely flat (as shown in Figs. 2 and 3). In some of the others which *did* come uncoupled, the cotter keys backed out before any noticeable damage was done to them.

Tests Yield Plus Results

Although failing to support the original cause-of-uncoupling theory, the tests yielded a number of plus results.

After the vibration test, each unit was tested for 60-cycle flashover and pulled to destruction in a tensile test. Even though the cement had chipped away from the ball-bolts on many of the units (allowing the bolt to move freely as much as ⅛ inch), all units tested well over rated 60-cycle flashover with the exception of one which had been contaminated by metal particles in the vibration test. (The loosening of the ball-bolt from the cement would undoubtedly cause radio interference, but this was not considered in these tests).

Of the 138 units tested, only three fell below the 15,000-lb EEI-NEMA rating after surviving the vibration testing, and these three units broke in such a manner as to indicate that the lowering of their strength was not a result of the vibration testing.

This type of testing appears to provide an excellent accelerated life test for suspension insulators, insofar as mechanical duty is concerned. Any suspension insulator is bound to be subjected to a certain amount of vibration in normal service even where no "galloping" or uplift is involved, and the vibration tester should "age" insulators in short order!

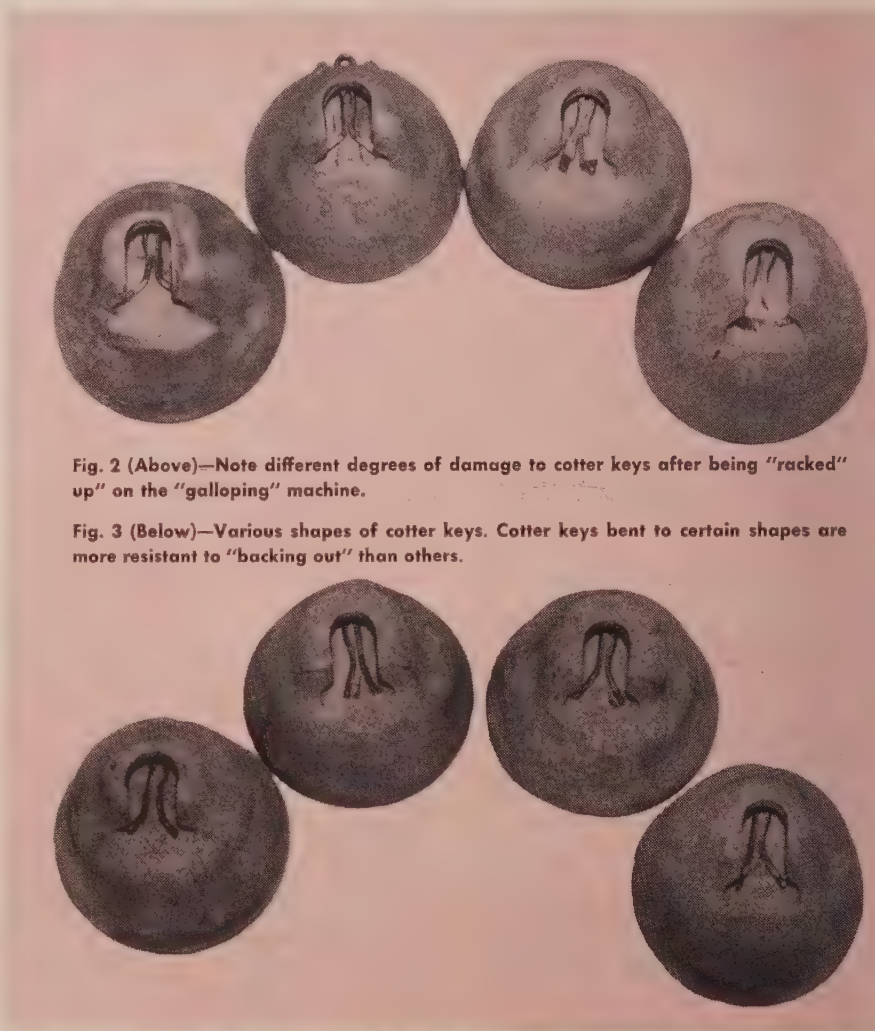
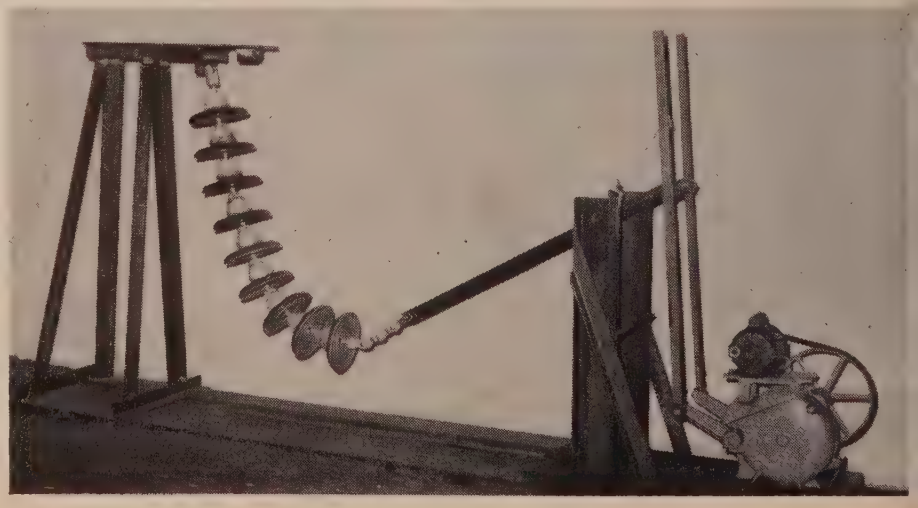
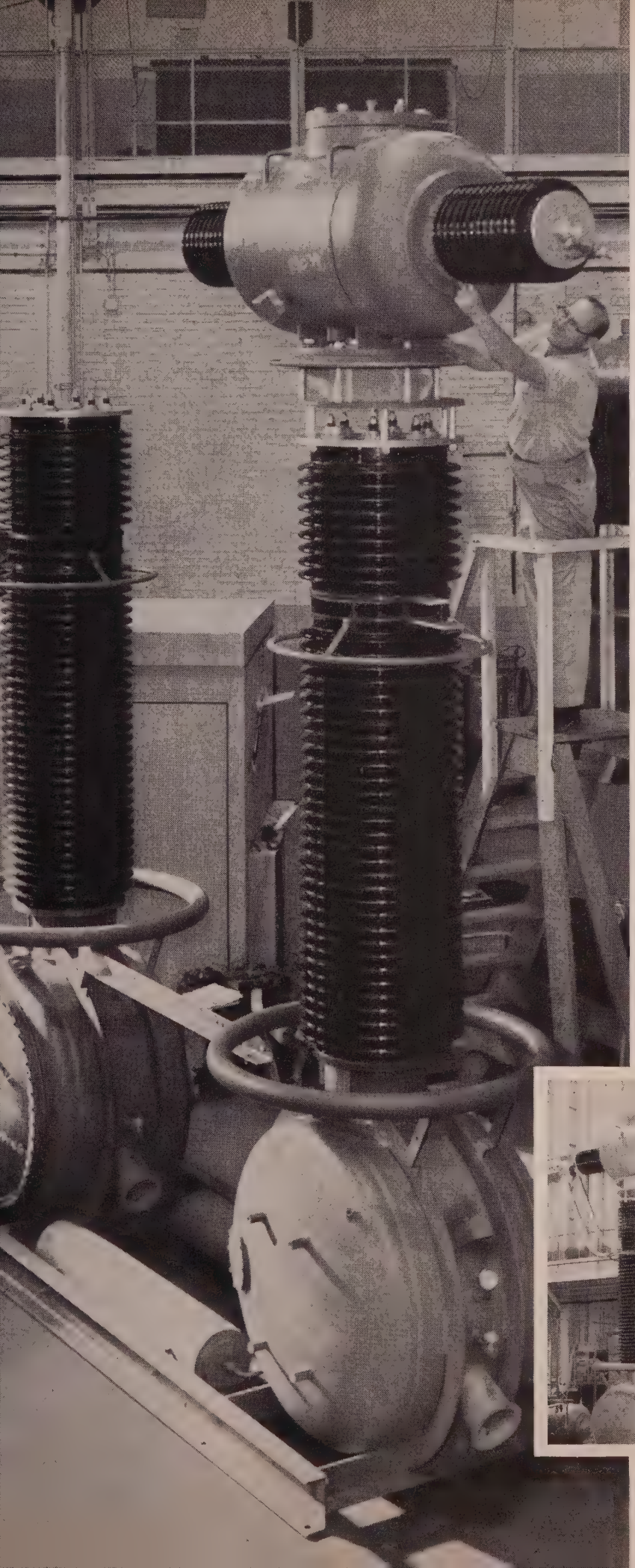


Fig. 2 (Above)—Note different degrees of damage to cotter keys after being "racked" up" on the "galloping" machine.

Fig. 3 (Below)—Various shapes of cotter keys. Cotter keys bent to certain shapes are more resistant to "backing out" than others.

Fig. 1—"Galloping" conductor and uplift conditions are duplicated by the vibration testing machine. Developed by NSP engineers, it translates the reciprocating action of a pump-jack to a suspension string through a lever and chain arrangement. Amplitude of the motion can be varied by changing lever arm length and number of links in the chain.





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Protection for Supervoltages, Plus Fast Installation and Easy Maintenance

Proven in service, General Electric ATB air-blast circuit breakers are easy to install and maintain, and provide practical protection for transmission systems 115 to 460 kilovolts and higher.

Supervoltage protection is provided by the equipment's modular design, which permits ratings above 115 kv to be built by adding interrupter heads in series.

Installation is easy, because components are shipped complete, ready to be bolted in place, and because G-E air-blast breakers are up to 50% lighter than comparable oil units. Interrupters weigh less per kva than any others.

Maintenance is needed only one-third as often as for conventional oil breakers, and can be completed in one-fourth the time, because of shorter arc duration and easy accessibility of operating parts.

Ask your G-E sales engineer for more information. Or write to Section 494-04, General Electric Co., Schenectady 5, N. Y.

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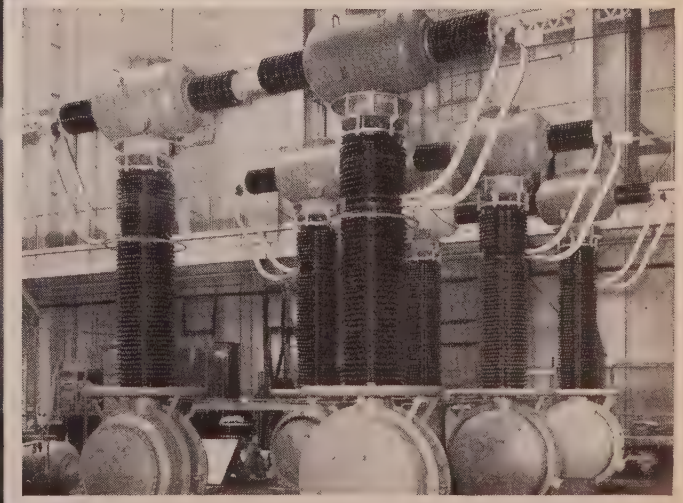


GENERAL ELECTRIC'S EXPERIENCE in building air-blast breakers is your assurance of superior performance. Breakers above, rated 230 kv, are being readied for shipment.

Switches, Underground, Right-of-Way, Maintenance All Get Full Attention From EEI T&D Meeting

A full gamut of operating, research, and planning problems was run at the EEI Transmission & distribution Committee Meeting held in Pittsburgh, Pennsylvania, May 10-13. About 200 members and guests attended.

Non-Venting Limiters

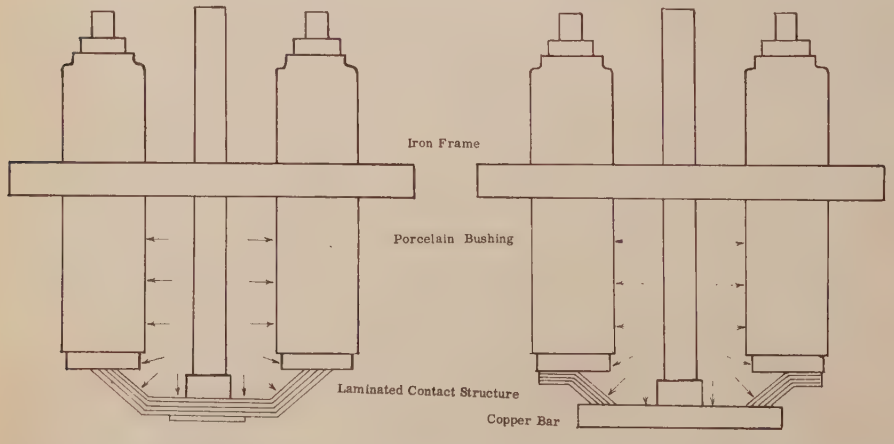
Application of limiters on 277/-480-v secondary networks was discussed by T. E. Starrs, Public Service Electric and Gas of New Jersey. He stressed the importance of terminating fault current on a 480-v bus without creating an ionized atmosphere either within the limiter or in the immediately surrounding area. For all practical purposes, when the fusible device operates it should do so without venting, he said.

The high interrupting capacity, non-venting requirement ". . . is best met in the use of the so-called silver-sand type limiter," he said. It consists of a number of short necked, silver links connected in a circle between two massive, silver-plated copper blocks. Structural strength is provided by a synthetic-fibre tube connecting the two blocks on their center line. The space between links and between tube and links is filled with a fine quartz sand and the whole is enclosed within an impregnated synthetic fibre cylinder, pinned to the copper blocks.

"Since the speed with which a silver-sand fuse operates means that the interruption, under fault at least, takes place at a relatively low value of current, there is considerably less energy to be dissipated in the arc than would otherwise be the case. As a result, the volume of silver vapor generated is quite small, and since, at the fusion temperature of silver, the quartz and sand immediately surrounding the arc will also fuse but will not be volatilized, there is no build-up of pressures within the fuse case, so there is no venting action, and no sound," he said.

More "Mileage" From Switches

W. H. Meade of Boston Edison described how his company modified its large number of 300-amp (rated) three-pole oil switches to increase momentary current capability from 10,000 amps to something in excess of 25,000 amps, while all other characteristics of the switch were comparable with those of the original design. Capability had to be increased because of increased loading on the system, and consequent higher short circuit current availability. Sketch at left shows what modifications were necessary.

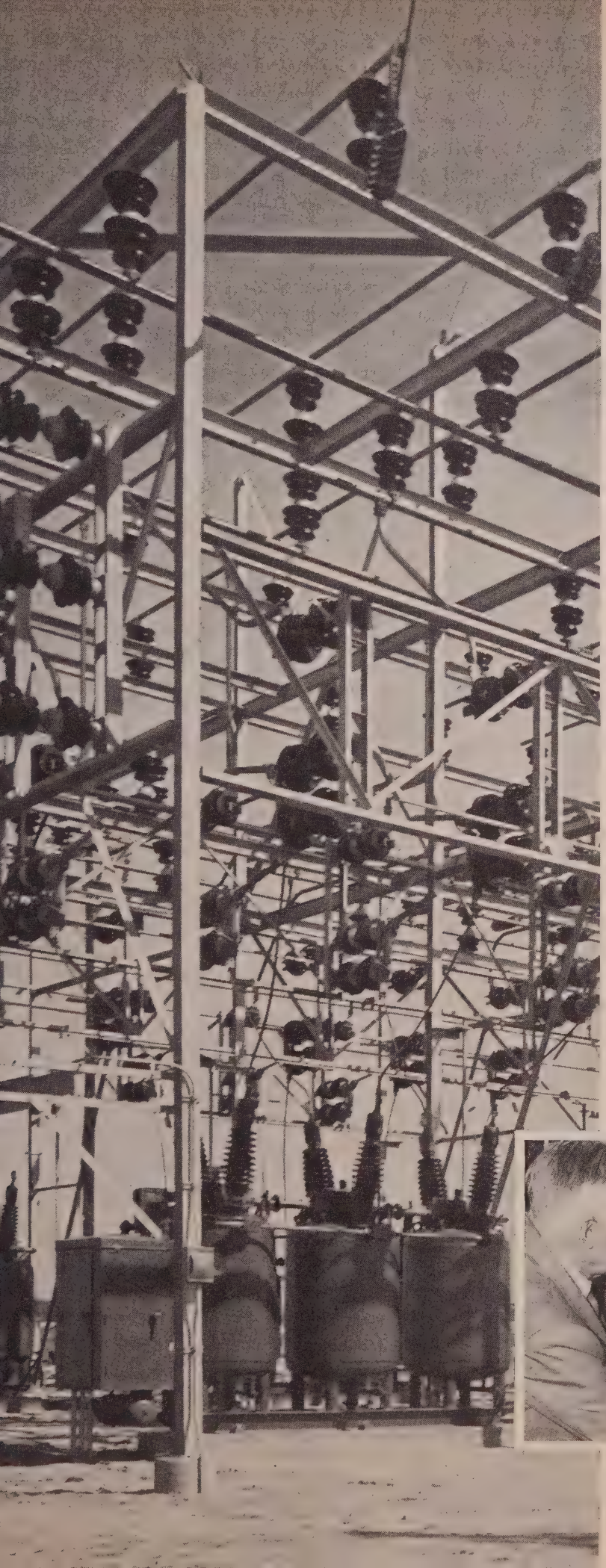


Here is how Boston Edison converted its three-pole oil switches. At left, original construction laminated contact structure was pushed off contact bushings by mechanical forces due to high current (arrows). Redesign at right takes advantage of the forces which push the laminated contact structure (now attached to contact bushings) down on a solid copper bar attached to the actuating rod.

"Here's the latest type kite that can get into our lines (metal supports with plastic sails)," says EEI T&D Committee Chairman H. E. Cody, Cleveland Electric Illuminating.

Cable Trouble Trend Continues Up

The 1958 underground cable performance report was discussed by Howard L. Davis, Jr., Philadelphia Electric. Based on reports of 16 companies which submitted data on the operation of almost 20,000 miles of cable, 411,000 joints, and 73,000 terminates, the trouble rate for all high-voltage cable was 8.35 per 100 cable miles. "This is the second highest rate that has occurred since 1948 and serves to confirm that the trend of troubles remains upward," he said. The trend is sus-



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Optimum Station Design, Plus Savings in Engineering Manhours

General Electric engineers have put digital computers to work to help custom-tailor outdoor stations. Result: You get optimum station design with minimum time required by your engineers.

Structural design is specified by General Electric engineers after detailed study of line requirements, and wind, ice and soil conditions. Use of digital computers assures that structural members have the required safety factor and lightest possible weight. Savings in material are passed on to you, of course.

You may choose aluminum or galvanized steel structures when you select a General Electric-designed station. Furthermore, you have a choice of lattice-work type structures, or rolled-shape columns, as illustrated. Either way, you get the responsibility of one manufacturer, from design "up".

Why settle for less? For more information, contact your General Electric Sales Engineer. Or write to Section 495-11, General Electric Co., Schenectady 5, New York.

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GENERAL ELECTRIC

DIGITAL COMPUTERS ARE USED to help G-E engineers design a station to met your exact system requirements at minimum cost.

"Good luck, John!" says D. F. Tulloch, Boston Edison (left), as he hands over his Underground Subcommittee Chairmanship to John Hennessy, Baltimore Gas & Electric.

tained by the combination of mechanical damage and unknown causes. Troubles due to corrosion and miscellaneous causes remain reasonably constant, and those due to inherent causes continue to decrease.

Here are the trouble rates for the five major classifications of causes with their percentage contribution to the total rate:

Cause	Troubles per 100 Cable Miles	Percent of Trouble
Mechanical Damage	3.61	44
Corrosion	2.03	24
Unknown	1.44	17
Miscellaneous	0.94	11
Inherent	0.34	4

There were no troubles experienced in 1545 miles of pipe-type cable.

The joint trouble rate of 1.45 per 1000 joints was caused by 426 failures and 171 removals. Troubles due to inferior design and corrosion are continuing to decrease while those due to unknown cause are increasing.

Termination troubles were 1.05 per 1000 terminations.

Seeks Lower Loss Ratio

"Our company would be able to derive an average savings of about $20 per transformer if the manufacturers are able to produce a transformer with a lower loss ratio and lower total losses," said Kenneth W. Klein, Cleveland Electric Illuminating. "Based on last year's total sales of distribution transformers, this could mean a possible savings of $20-million per year to the industry as a whole," he said.

Rather than have each company determine its own optimum loss ratio, Mr. Klein suggested that a universal-type study be made, so that a recommendation for a single loss ratio that would help all, could be recommended to the manufacturers.

Involved in such a study would be: copper loss, core loss, regulation, exciting current, and fixed charges on initial investment. He proposed using the annual operating cost method of studying these factors, because it will compare any existing transformer and yield information on the unit which gives the most dollar value.

He presented sample calculations to illustrate the effect of load and loss factors on these costs. Additional costs calculations were included to show the effect of the loss ration (copper to core ratio) change from 3.5 to 2.0 and finally to 1.5. These calculations are all based on the 25-kva 4.8-kv transformer designs chosen for the analysis. Exact electrical characteristics assumed for the study were all listed. (An article on this subject by Mr. Klein will be published in an early issue.—Ed.)

Seeks Single-Phasing Help

F. E. Johnson, New Orleans Public Service, Inc., urged that full cooperation be given by the EEI T&D Committee in handling and returning a questionnaire relating to the single-phasing of three-phase motors. This questionnaire is being prepared and distributed by Underwriters' Laboratories, Inc., through the joint support of EEI and NEMA, and directed through a Task Committee working under N.E.C. Code Panel 11. This Task Committee is made up of engineers, with one representative from NEMA, one from EEI, one from the Industrial Control Manufacturers, one Electrical Contractor, and a chairman from the inspection group.

The questionnaire will be sent to electric utilities, electrical inspectors, equipment manufacturers, motor repair shops and contractors, industrial and non-industrial users of motors. Information desired from the utilities is to include data concerning size of system, type of transformer connections and protection arrangements, as well as experience with the single-phasing problem.

Those utilities who have been presented with damage claims by customers as a result of single-phasing, should be quite interested in the results and knowledge gained through the questionnaire.

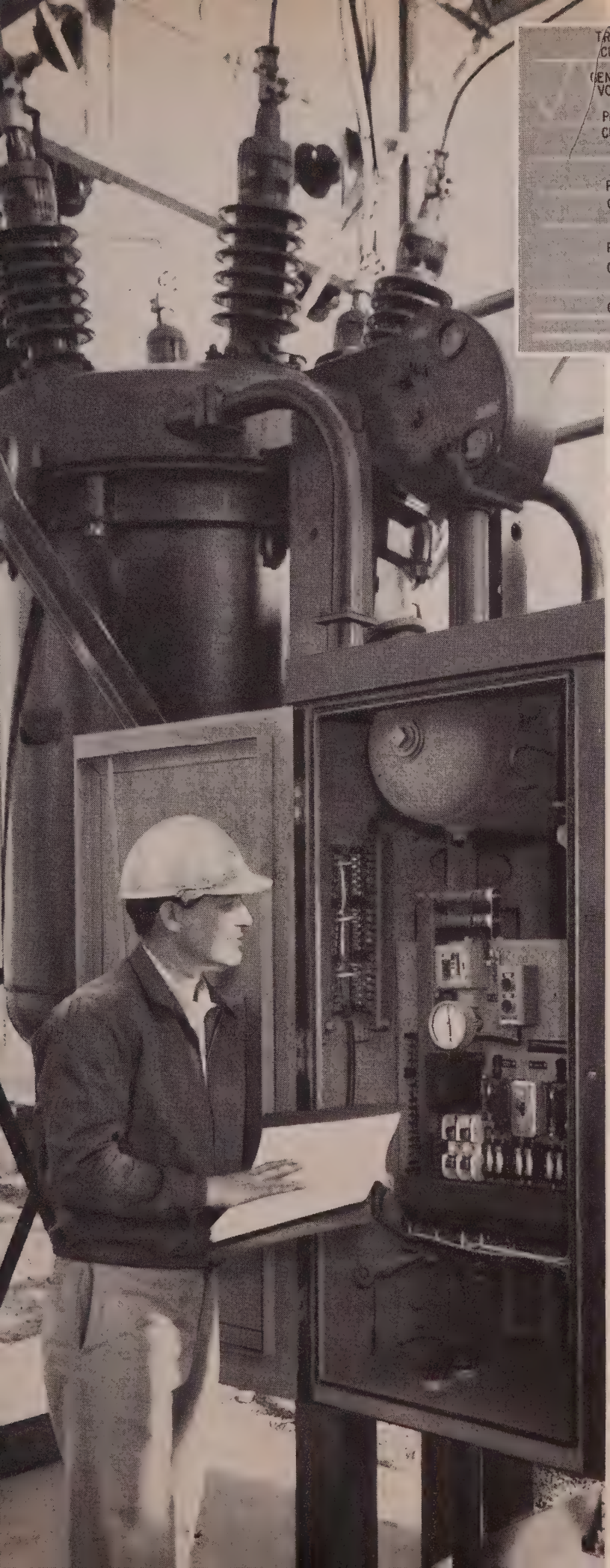
Most of the troubles have been occurring with motors of ten horsepower or less, according to Mr. Johnson.

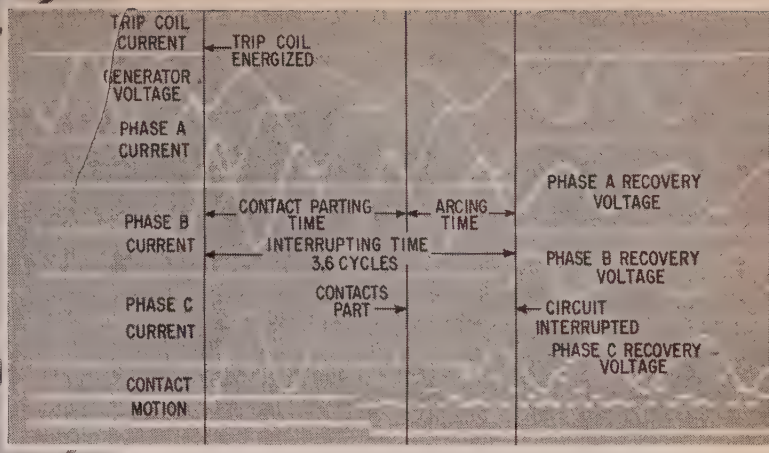
Uprating Towers Can Save

In companion papers, R. D. West and R. G. Anderson, both of Duquesne Light discussed the upgrading of existing transmission facilities, and the increasing of clearances of energized steel tower transmission lines, respectively.

Said Mr. West, "As a result of the electrical and structural studies and field tests made to date, it is now considered to be perfectly feasible to convert most of the company's existing 69-kv lines to 138 kv. It is recognized that the converted lines will not be the full equivalent of modern 138-kv tower lines in terms of remaining life; however, the potential of large reductions in capital expenditure is a factor of great significance. While other considerations have delayed the application of these conversion methods, it is expected that they will be applied within the next few years."

Previous structural studies have indicated that many of the older towers are capable of increased conductor loadings up to 6000 lbs, he revealed. With this in mind, a detailed structural study was made of all types of existing 69-kv towers. Consistent with modern transmission practice emergency conductor





Five-cycle performance of G-E one-tank sub-transmission breakers is demonstrated in the oscillogram above. Conventional breakers are rated to interrupt in eight cycles. Photo shows one of 17 G-E one-tank breakers installed by The Potomac Edison Company, Hagerstown, Md.

WITH GENERAL ELECTRIC ONE-TANK SUB-TRANSMISSION BREAKERS, YOU CAN . . .

Cut Interruption Time to Five Cycles

Five-cycle performance of General Electric's one-tank sub-transmission breakers (15 kv through 46 kv) provides superior system protection. This is a full three cycles faster than industry requirements for breakers of this class. Here's what quicker interruption means to you:

- Chances of line burn-down are reduced;
- Inspections and maintenance can be reduced, because oil carbonization and contact wear are minimized.

Five-cycle interruption is possible because of the interrupter efficiency and compactness of the G-E one-tank breaker. Since linkages are shorter and lighter, contacts part in 2½ cycles or less. Field-proven oil-blast interrupters also help decrease interrupting time.

Why settle for less? For more information, contact your G-E Sales Engineer. Or write to Section 494-01, General Electric Co., Schenectady 5, N. Y.

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"Our jack will take towers up 20 feet," R. G. Anderson (right), Duquesne Light, answers a floor query with R. D. West of Duquesne, as Overhead Subcommittee Chairman Russ Hicock, Connecticut Light & Power (rostrum) leads discussion period.

loading conditions were relaxed to one broken wire and special attention was given to the proposed practice of straining all suspension towers. The study disclosed that all of the towers were capable of meeting the new loading requirement with only minor replacement and reinforcement of secondary members.

Foundations of the older towers are generally of the steel grillage type. No foundation problems are anticipated although occasional reinforcement of the tension side of angle towers may be required. Steel grillages exposed over the years have been found to be remarkably free of corrosion, he said.

He reported that a sample check of about ten percent of the towers planned for conversion has disclosed no evidence of deteriorated bolts of members. "It is reasonable to expect that with continued careful attention to tower maintenance an additional 30 to 40 years of life is left," he said.

Detailed studies and estimates have been made on about one half of Duquesne's older 69-kv transmission lines. Costs of converting to 138 kv have been found to be from one third to one half the cost of providing a new line.

Mr. Anderson showed how Duquesne uses its tower jack to raise towers 20 ft for extension additions. Basically, the device is a structural steel frame consisting of four jack columns tied together with adjustable girts and braces. Each jack column rests on a foundation of two stub angle clamps which in turn are clamped to the tower stub angle.

The jack column is a rigid structural member which supports two jack screws which are power driven through worm gears at the bottom of the jack column. A threaded lifting cradle is mounted on and is driven upward and downward by each pair of jack screws. A traveling leg clamp, attached to this lifting cradle, is then bolted to the tower leg above the ground line splice and provides means by which each corner of the tower is raised. Load-bearing cross bars hold the jack screws at the top and bottom of the jack columns. With this arrangement, the jack screws are always in tension even under the condition of uplift on one side as in the case of angle towers. The device can be adapted to raise any type of tower.

To date Duquesne has used the jack to raise 21 towers. With the exception of the first tower, all of these tower-raising operations were done with completely energized circuits.

"In view of the development and building around some towers we are convinced that the use of the tower jack is the only practical means of raising these towers in order to avoid complete circuit outages of as much as a week," said Mr. Anderson. "It is expected that the tower raising program will be continued as required and when the conversion of 69-kv lines to 138 kv begins, the program will probably require the purchase of an additional tower jack.

Woodpecker Is Still King

"We still don't have the answer to the woodpecker damage problem," said Professor Richard N. Jorgensen, Pennsylvania State University. Since the bird doesn't eat the wood it pecks, "it hasn't responded to the 175 chemicals tested."

The chemicals were tested on Pileated (the red-crested ones) Woodpeckers which were successfully raised to adulthood in captivity.

Professor Jorgensen said the woodpecker can be kept from damaging a pole through many different methods—epoxy resin coating included—but that they are too expensive.

Latest attempts to solve the problem include the use of an animal psychologist. It seems that animals talk and signal to each other in ways that people don't recognize. Many different audio frequencies don't scare them, however. One theory advanced by Professor Jorgensen is that the Pileated Woodpecker may use its special white wing pattern in a certain way while flying frightened, to warn other birds of danger.

On the agenda is a try at scaring woodpeckers with a recording of a distressed woodpecker sound. (The Professor played such a recording for the meeting.) If successful this method could be used from a line patrol helicopter at regular intervals.

R/W Control Over 13 Years

In his progress report of 13 years experience with chemical right-of-way control, F. A. Ashbaugh, West Penn Power listed some of the many advantages which have accrued. They included the following:

1. Steady reduction in the quantity of right-of-way requiring maintenance on any particular line. A recent random selection of five 25-kv lines showed that in 1947 there was a measured 84.75 acres of right-of-way to be maintained. In 1960, a survey of these same lines showed only 43.03 acres to be maintained.

2. When right-of-way is mechanically cleared, it usually becomes difficult to traverse within a few months after clearance. Chemical control maintains the right-of-way in good condition year round.

3. A properly programmed long range right-of-way control plan will result in costs from 50 to 65 percent lower than equivalent maintenance by mechanical means.

4. With mechanical right-of-way clearance, noxious plants such as poison ivy, briers, etc. are difficult

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Industry In Conference—

(EEI T&D—Continued)

to control. When chemical methods are used, such plants are readily eliminated.

5. Chemical control has reduced costs. At West Penn, "we are convinced that if we were to maintain our right-of-way by mechanical means, in the condition we maintain it chemically, it would cost more than $200,000 more than our present costs," he said. In 1948, West Penn spent in terms of 1959 dollars, $1.113 per customer while in 1959, they spent about $0.81 per customer for spraying and mechanically clearing their rights-of-way.

"Thirteen years ago, there was considerable skepticism when the possibility of using chemicals to control woody plants was first proposed. That skepticism has faded and now chemical right-of-way control is an accepted tool everywhere for the maintenance of right-of-way," he concluded.

SEE Engineers Told How To Prepare For Tomorrow's Management Manpower

The most important problem that utility management men have to deal with today, is management manpower for tomorrow, according to W. C. MacInnes, SEE president, Tampa Electric Co., in his address before the Engineering and Operations Section Conference of the Southeastern Electric Exchange held at New Orleans April 6-7. More than 600 utility engineers, manufacturers' engineers and representatives, and college deans and professors attended the sessions.

"We can no longer think in terms of how the job was done yesterday, we must focus all of our attention on how the job must be done tomorrow in order to prepare ourselves and our successors for tomorrow's responsibilities," said MacInnes.

Six steps should be considered to prepare for management manpower for tomorrow, he recommended. We must:

1. Find a way to make our industry known to talented young men prior to the time they seek employment.

2. Improve our recruitment methods.

3. Make ourselves more attractive to prospective employees by establishing the fact that this industry provides many economic rewards and a highly satisfactory and even exciting career.

4. Be sure that the on-the-job training program will provide the necessary rounding out that is needed for the management jobs that have to be filled when time for advancement arrives.

5. Maintain a satisfactory continuing evaluation system to assure ourselves that men are making the right kind of progress.

6. Try to provide the opportunities early enough in the man's life so that he will have the chance to carry heavy responsibilities while he is mentally and physically young and for a sufficient period of time to give him the satisfaction of seeing his programs through to fruition.

New SEE President, W. C. MacInnes, president, Tampa Electric Co., outlines six steps in preparing for tomorrow's management manpower. At left is L. J. Cucullu, vice president, New Orleans Public Service, Inc., vice chairman of the Conference.

Operating Problems

Discussing operating problems confronting utility management, G. C. Rawls, president, Louisiana Power & Light Co., said personnel problems are the most exacting and probably the most important. "If we can keep our companies adequately staffed with competent, loyal employees, we will be able to solve the many problems that face us," he stated.

About 99% of residential service should be from newly-designed single-phase distribution systems fed from a modern shielded three-phase feeder, suggested Rawls. He urged investigation of cost, performance and over-all efficiency of such single-phase service and education of manufacturers on 5 and 7½-hp single phase household air conditioners or heat pumps.

Engineering Outlook

One of the major engineering tasks of the next decade will be centered on the further control of the evil effects of inflation by increasing efficiency of production, according to W. H. Colquhoun, vice president-engineering, Ebasco Services, Inc. This will not be an easy task, he warned. Inflation will not only result in rising prices, destruction of savings and higher taxes, but it will also affect our ability to sell our goods and services abroad. And it greatly improves the competitive position of foreign manufacturers that are going after American markets with great vigor, he said.

Colquhoun predicted that the next 10 years will see a "tightening up" of the integrated engineering staffs of utilities and consulting engineers. The limited supply of competent engineers and supervisors will force improvements in organization and efficiency of such groups, he stated.

Practical Politics for Business

J. J. Wuerthner, Jr., consultant, Community and Business Relations, Public Affairs Service, General Electric Co., urged that more businessmen learn to use the skills of our American competitive system in both political parties. He said that we must do our part to bring about renewed understanding of our free-choice system and our reliance on basic constitutional principles. The need is for courageous and sensible action in the political arena, patterned on the best traditions of our free economic society and inspired by businessmen harnessing their judgment, skills and earnest convictions toward bettering the common good of all Americans, Wuerthner stated.

New Power Generating Methods

In describing the new and more-

Single column of Type ATB air-blast power circuit breakers—115–460 kv.

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Distribution Committee Chairman, M. L. Cathey (left) superintendent of distribution, Georgia Power Co. with speakers J. W. McKay, Tampa Electric Co. and H. E. Campbell, General Electric Co.

direct methods of power generation, Dr. S. W. Herwald, vice president—Research, Westinghouse Electric Corp., said that all had one thing in common. They attempt to take stored energy out of storage and put it to work in the most efficient and economical way. The four "new" methods described by Dr. Herwald were: fuel cells, thermoelectricity, thermionic conversion and magneto-hydrodynamics. He said, however, none of these are really new in principle.

Dr. Herwald predicted that these new methods would eventually be used for both large scale power generation in electric utility systems and for smaller and more immediate tasks. First they will fill a gap in presently exploited techniques, performing functions we cannot do quite so well in any other way. Then, as our technology increases, they will grow in size and efficiency to compete with internal combustion engines, gas turbines and other power sources, he said. No one method is likely to be "the one way to do it," Dr. Herwald said.

Measuring Line Crew Productivity

J. W. McKay, Tampa Electric Co., outlined a method of measuring and developing the efficiency of line crews from which an accounting procedure could be developed that would put all construction, maintenance and operation on a unit cost basis. He said that it would enable department heads to develop crew efficiences; the Engineering Department to do more accurate estimating; the Planning Division to forecast future expenditures realistically and the Accounting Department to charge capital and expense accounts based on actual costs.

In a further discussion of the work measurement of line crews, Joe P. Gills, Charleston Division Manager, Appalachian Power Co., described his Division's work management system which has produced the following surprising and significant results:

1. A 10% improvement in performance by all 17 crews amounting to at least $63,000 for the first year (about $250,000 for the entire company).

2. More accurate reporting of payroll time by crews—improving account classification.

3. Improvement in accounting for material, enabling a more accurate charging of materials and preparation of work order completion reports — with no increase in clerical personnel.

4. Shows Management if a foreman is operating efficiently.

5. A friendly competition among crews and foremen is created.

6. Cost of construction can be better estimated.

7. A much better planning job—and of fitting proper size crew to the job.

Gills said that 14% of the total operating expense of his company was transmission and distribution and 54% of this was labor. Thus, about 7% of the total Company operating expense is paid as wages and fringe benefits of line crews.

New octagonal tapered welded-aluminum pole model is shown by G. C. Rawles, president, Louisiana Power & Light Co., to illustrate an esthetic appearing structure for high voltage lines, which traverse city streets. New pole was developed by Line Material at request of Louisiana Power & Light Co.

Underground Systems

Some time in the not-to-distant future, electric utility residential distribution is going to be underground, F. M. Fister, Louisiana Chief Engineer, Southern Bell Telephone & Telegraph Co., predicted. He said that too much emphasis is placed on higher first cost as a reason for not burying cables, even though this practice is safer, service is better and the public likes it better and would be willing to pay more for it. Where terrain and other conditions are favorable to a buried system, the point has been reached where it can be put in the ground as cheaply, or more cheaply than on poles—if the sub-division is developed us a unit and the houses constructed under a schedule that will permit trenching and plowing in most of the cables, terminals and service wires in one undertaking, Fister stated. This kind of installation can become very expensive if it is not planned, supervised and coordinated carefully, he said.

Aluminum residential underground system costs $52 more than a minimum overhead system on lots that are "back to back," according to study figures reported by V. K. Smith, distribution planning engineer, Mississippi Power & Light Co. He said that there are many advantages that outweigh the additional cost over conventional overhead:

1. Customer relations are improved.

2. Maintenance costs are less because it is less susceptible to storm damage and tree-trimming is eliminated.

3. Load building program is promoted, resulting in higher customer utilization.

4. Service is improved—less exposure to the elements that cause interruptions.

5. Relations with home builders are improved because of higher F.H.A. evaluation.

6. More adaptable to curvilinear layouts.

R. E. Raymond, superintendent

(Continued on page 121)

of T & D, Florida Power Corp., said that there was a need for standardization of pad-mounted transformers having provisions for eight secondary runs.

Computers For Load Checking

More distribution engineers will find computers helpful in their daily work of building systems to be more efficient, economical and reliable, as the technique of using them becomes better understood, according to H. E. Campbell, Electric Utility Engineering Section, General Electric Co. They are using the digital computer to do a better job in load checking, designing and planning systems with fewer manhours, he said. Once computer programs are written, it is a simple matter to insert new costs and conditions and obtain results in a matter of minutes. These programs make it relatively easy to analyze the effect of cost and construction changes in a system, Campbell stated.

Optimizing System Design

New distribution system planning techniques and the principles obtained from their application were described by David N. Reps, distribution engineer, Electric Utility Engineering Dept., Westinghouse Electric Corp. He said that results show that these new techniques provide the distribution system planner with tools and decision-making guides heretofore unavailable. Application of this new knowledge will assure the optimum or the most practicable and economic growth of distribution systems for the future, Reps stated. This approach obviously requires that a great many cases be studied, and the digital computer relieves the engineer of many tedious calculations, he said.

M. Monlezum, New Orleans Public Service, Inc., in discussing Rep's paper said that the assumptions made and values assigned to certain factors in any theoretical study are not always met under actual conditions. Load densities are not uniform nor consistent and usually the system layout cannot conform to the theoretical design plan, he stated.

Transmission and Large Substation Committee Chairman Paul S. Colby, (right), Carolina Power & Light Co., with speakers Joel Daniel, Georgia Power Co. (left) and George L. Finley, Duke Power Co.

19.8-kv Distribution

W. L. Westbrook, Atlanta Division Manager, Georgia Power Co., described a recent installation of 19.8-kv distribution in the Buckhead area. He said that the operation has been excellent so far, with only one lightning arrester failure and no fuses blown. Higher poles were used than those installed in the original 4-kv system in order to be able to safely string in the 19.8-kv primary and make the transformer installations before starting the cut-over, Westbrook stated.

In commenting on Westbrook's paper, P. D. Huff, assistant manager, Distribution Engineering and Operation, Duke Power Co., related his Company's experience in converting to 24.9-kv distribution. He said that the use of an insulated aerial lift permitted them to work on both 12 and 24-kv circuits with rubber gloves instead of hot sticks.

New Distribution Ideas

J. E. Ames, III, staff engineer, Virginia Electric and Power Co., described five new ideas that have proved successful in the Company's distribution construction. They have reduced some construction or operating cost and, at the same time, improved customer service, he said. These new ideas were:

1. Transformer installations on 35-ft joint-use poles; 2. Double deadends; 3. Pole stubbing; 4. Secondary spacers; 5. Service drops.

All materials used are standard items available from the manufacturers, Ames stated.

In discussing these new distribution ideas, J. A. Lasseter, System Engineer, Florida Power & Light Co. agreed that bundled cables for large capacity services is a good solution to the support and appearance problem. He said that, at times, these conductors can be carried straight through to the transformer terminals thereby eliminating a number of large conductors. He advised that construction crews be sure to use rubber-neoprene cable rather than the neoprene-covered line wire normally used for services.

Automated Steam Stations

The constant checking of steam plant conditions by a digital computer through appropriate sensors may well prevent catastrophic damage, said L. F. Kennedy, Electric Utility Engineering Section, General Electric Co. The prevention of just one such occurrence might more than pay for the computer control system, he said. With the unit under the control of a programmed computer sequence during critical times of a startup, shut-

Production Committee Chairman R. W. Olive, (second from left), Duke Power Co. with Paul J. Hamm (left), C. H. Wheeler Mfg. Co.; C. C. Franck, Westinghouse Electric Corp., and G. M. Oldham, Shippingport Atomic Power Station.

down and emergency conditions, human operating errors would be practically eliminated, Kennedy stated.

Data Handling

In describing the experience of South Carolina Electric & Gas Co. with data handling equipment at its McMeekin Station, O. W. Dixon, Jr., electrical supervisor at this station, said that it provided the following advantages: more efficient operation with fewer operating personnel; hourly logs always taken on time with negligible delay between readings; operator has rapid and continuous flow of pertinent operating information readily available; effect on efficiency of any change in operating conditions can be closely and continuously observed; turbine efficiencies can be determined quickly and for all steaming conditions, knowing interstage pressures and temperatures.

Fuel Cells

Fuel cells may be somewhat of a competitor of electric utilities serving as independent sources of electricity supply in residences and buildings supplied by gas, said Dean Walter J. Seeley, Duke University. They may also serve as a source of industrial power in those operations where dump gas is a by-product. If the fuel cells can be developed as the long-desired reversible energy-storage device, similar to a storage battery but devoid of its present limitations, it may eventually become a substantial consumer of off-peak kilowatt hours, he stated.

Shippingport Experience

In describing the operating and maintenance experience at Shippingport, G. M. Oldham, superintendent, said that the most reliable and troublefree component in the Station is the reactor. With the exception of some minor instrumentation problems, this component has given no trouble. The reactor core life is very promising and the original estimate of 3000 effective full power hours for the first seed has been exceeded and nearly doubled, Oldham stated. There is considerable evidence that

the blanket fuel elements will also last much longer than originally estimated.

Loading 110-kv Transformers

Joel Daniel, asst. supt. of transmission, Georgia Power Co., outlined the practices of his Company in loading 110-kv transformers. He said that every attempt is made to adopt some remedial measures when the loading reaches the fan rating (166% of self-cooled rating in most instances) of the unit. Since 1948, three-phase transformers, either singly or in pairs, are loaded as a bank of four single-phase transformers would be loaded. This practice is based on the reliability of the modern three-phase transformer, he stated. Single-phase transformers with spare, or excess capacity in paired three-phase units, will only be applied at those stations without, or with very weak interconnecting, sub-transmission tie lines.

Substation Surge Protection

In discussing lightning and switching surge protection of multi-line substations, J. M. Clayton, Westinghouse Electric Corp., said that economies can be realized by properly coordinating location of the protective device with the protected equipment. Modern lightning arresters limit the magnitude of surge voltages to a level well below the insulation levels commonly used in substation equipments. Therefore, equipment can be protected by arresters located near the equipment, and it is not necessary to apply protective devices adjacent to each piece of equipment to be protected, Clayton stated.

Right of Way Utilization

Where economics and finances permit, additional widths of right of way to accommodate anticipated future lines should be procured initially, according to Wylie Johnson, superintendent of transmission, Alabama Power Co. Where congestion and economics dictate, the "compact" right of way should be resorted to, he said. The increasing value of land makes it necessary that more effective measures be taken to work closely with prop-

erty owners in obtaining and exercising a utility's rights to construct and maintain transmission lines on their property. It is particularly important that utility practices in cutting danger timber be improved and standardized, he concluded.

In citing the disadvantages of easements in urban rights of way, R. L. Bortner, manager, Real Estate Dept., Potomac Electric Power Co., said that "you get more for your money when you buy the fee title and that, in an urban area, there is no difference between the cost of a fee and the cost of an easement." Bortner suggested that, when planning a major substation in a rapidly developing area, serious consideration be given to a site that will permit good screening. He said that PEPCo does not hesitate to purchase excess land as experience indicates that in many cases substantial amounts of money can be saved by purchasing an entire tract and salvaging the excess.

Reconductoring Energized 110-kv Line

The reconductoring of a 38-mile energized 110-kv line was described by J. L. Upchurch, Jr., construction coordinator, Carolina Power & Light Co. The most practical method was the use of a temporary arm at an angle above the 30-ft crossarm for transferring the existing conductor, he said. This permitted all conductors to be worked from the pole and at all times conductor clearance was provided to meet safety and flashover requirements.

345-kv Maintenance

By recognizing the hazards involved and with adequate equipment, 345-kv hot-line maintenance work is as commonplace with Appalachian Power Co. as is the use of rubber protective equipment for distribution voltages, according to W. Price Carter, system transmission line superintendent. He said his company is successfully washing and cleaning insulators on voltages up to and including 345-kv with a high-pressure water jet. The following safety precautions are necessary in such operations: water must be of high resistance, sufficient to avoid electric current leakage into the stream once it is di-

rected against the insulator; the nozzle and all other necessary equipment such as the pumper, pump truck, ladder truck, and tank truck must be securely grounded at all times; the nozzle operators must stay and remain a safe distance away from energized equipment; and prior to actual washing, a test should be made to determine the resistivity of the water. A minimum resistance for washing insulators hot is considered to be 1200 ohms per cu in., Carter stated.

Economies Of Gas Turbines . . .

(Continued from page 106)

cated at a substation which would result in deferment of transmission expenditure.

No specific account was taken of maintenance costs on the gas turbine in the economic evaluation. It is the authors' experience that operating and maintenance saving due to delay of the base load unit will more than offset the very low maintenance cost of the gas turbines.

These factors are somewhat intangible and the degree to which these benefits can be utilized varies greatly from system to system. It is important that these items not be submerged in a massive study where an innocent-appearing estimate might turn out to have an important, but unsuspected and unrecognized, influence on the evaluation.

The study outlined shows that the model system can effectively and economically use gas turbine capacity as compared to expansion by base load steam units. This is the first point which should be established. The study can be expanded to determine optimum number, size, timing, and location of gas turbine blocks.

References

1. "Decentralized Peak-Shaving, Its Economic Significance to Electric Utilities," Constantine W. Bary, *ASME* Paper 59-A-283.
2. "Production Cost Calculations for System Planning by Operational Gaming Models," K. M. Dale, W. H. Ferguson, C. H. Hoffman, J. A. Rose, *AIEE* Technical Paper 59-1176.

Announce New Westinghouse Meter Development

Magnetic bearing systems of an entirely new type have replaced conventional ball-and-jewel bearings in a line of single phase 120/240-volt watt hour meters announced by Westinghouse late last month.

In these meters, disk and shaft assemblies are supported by the magnetic repulsion between two small rings of barium ferrite, a ceramic-permanent-magnet material of high stability and strength. Mounted so their fields are opposite, these rings serve as the two working surfaces of a frictionless thrust bearing. Supplying the slight lateral forces needed to restrict horizontal movement are stationary pins within graphite journals which serve as guide bearings for the upper and lower ends of the shaft.

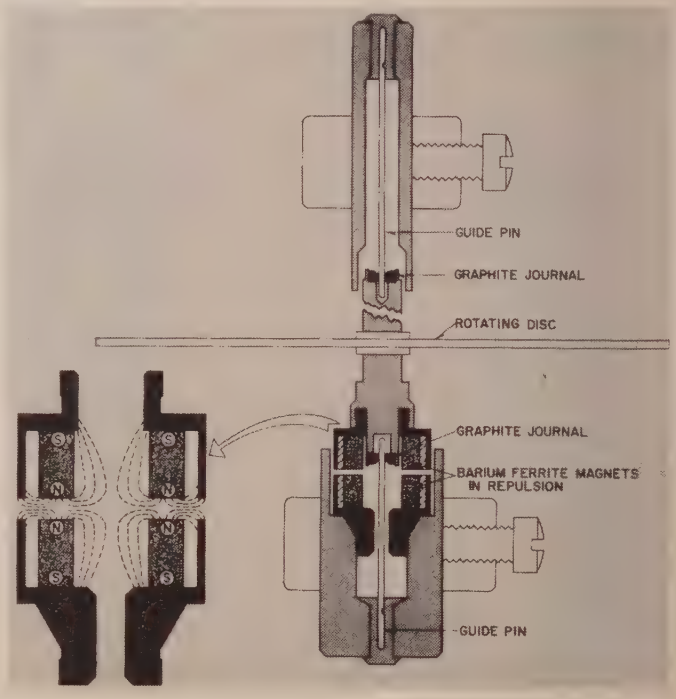

Diagram shows principle of Westinghouse's new magnetic bearing systems which have replaced the conventional ball-and-jewel bearing systems formerly utilized in their line of 120/240-volt, single phase watt hour meters.

According to T. D. Barnes, engineering manager for the meter department, the new Magnethrust bearings will be employed in all single phase meters produced by Westinghouse after June 1.

Advantages of the new system include ability to withstand shock, and vibration well above levels encountered in transit, immunity to thermal shock and environmental change, tolerance to off vertical installation, and the ability to perform accurately for a long period without maintenance.

Westinghouse also announced a new dual-range demand register which will allow installation for current service requirements with the ability to convert it in the field to match load increases in the future. The new registers may be converted from their nominal (100 per cent) operating ranges to alternative 200 percent ranges by removing, reversing, and replacing a double-surfaced scale plate. Another design change permits a large reduction in open time, the time required to reset the mechanism at the end of the demand interval—down to a fraction of a second. Further, compactness of the new unit permits a half-inch reduction in meter case height, horizontal in-line placement of its dials, and high corrosion resistance.

One of the first installations of a 138-kv S & C Circuit Switcher was completed in April at the Sigurd substation of the Telluride Power Co. The switch was installed for interrupting load and magnetizing current of a 138/46 kv, 21/28/25 mva 3-phase auto-transformer. The switch is installed on a structure with inadequate clearance for interrupting an open arc. Therefore the requirement for an interrupter. The use of the interrupter switch eliminates the necessity for a large steel tower upon which a standard airbreak switch has been used in the past.

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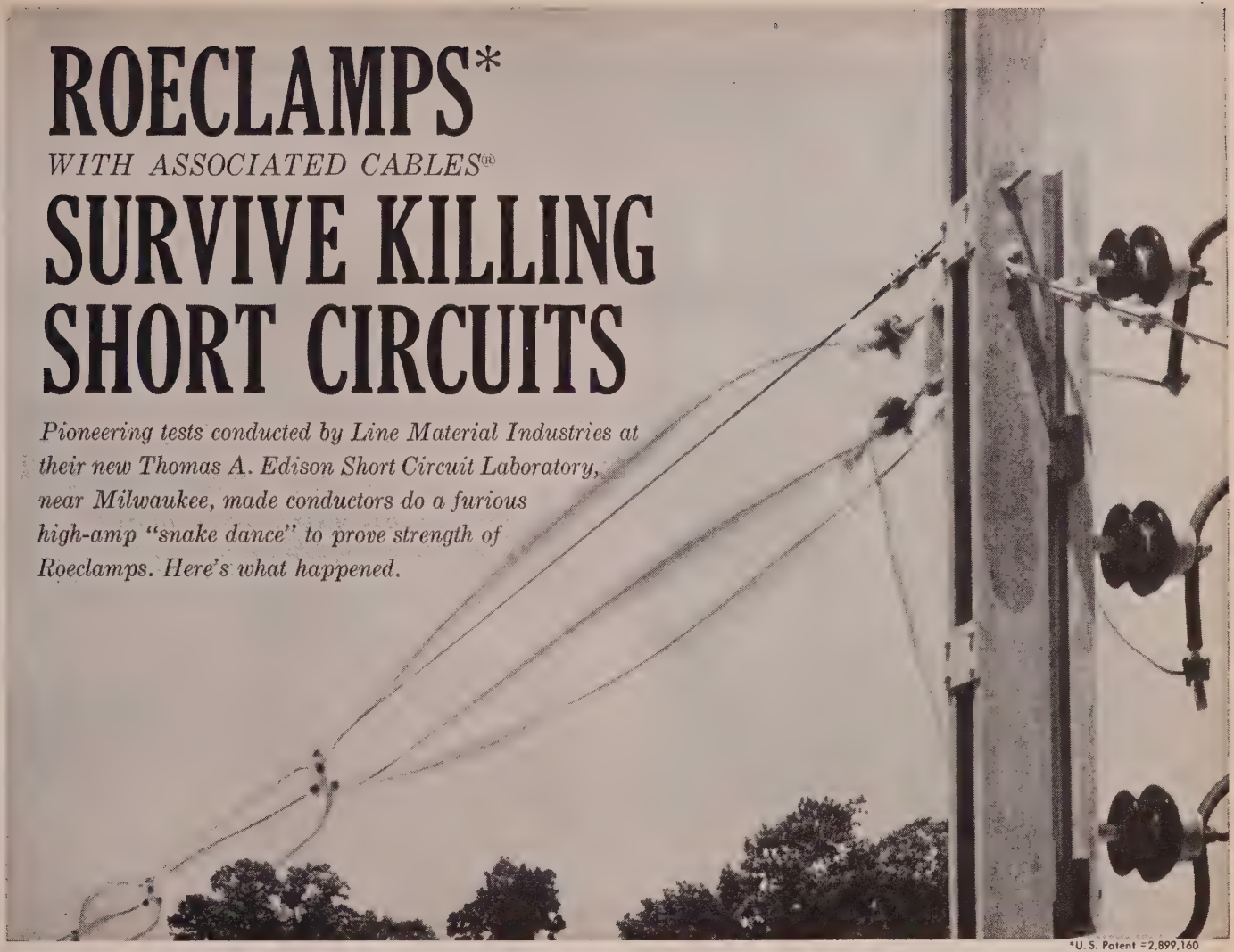
Pioneering tests conducted by Line Material Industries at their new Thomas A. Edison Short Circuit Laboratory, near Milwaukee, made conductors do a furious high-amp "snake dance" to prove strength of Roeclamps. Here's what happened.

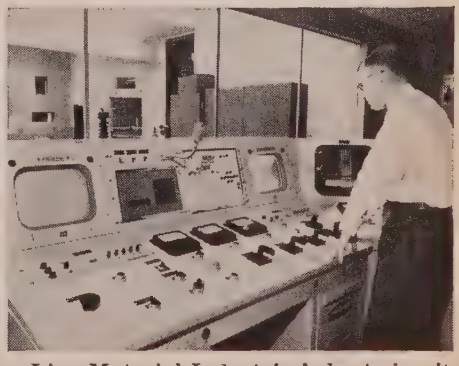


*U. S. Patent #2,899,160

In test shots #7 and #12, 14,300 and 14,200 amperes (asymmetric current) are applied for four cycles. 500MCM conductors are whipped around with incredible force. Strong 5KV and 15KV Roeclamps contain the cables, and withstand this fantastic overload. These were two of over a dozen test shots conducted in the impartial Line Material laboratory.

Roeclamps and various sized associated cables were installed in 128 feet span, shorted at far end and linked with power source and controls inside Line Material Industries' new laboratory. Every 30 feet a Roeclamp holds cables and messenger firmly in place. Roeclamps require no installation tools, can be mounted in less than a minute, even with "boxing gloves" on.

In test shot #2, 3950 amperes (asymmetric current) was applied for 30 cycles to a #6 AWG conductor. This was approximately 100% beyond the rated thermal capacity of the insulation. Note that the 5KV Roeclamps are undamaged. In this test the intense heat (conductor temperature 395°C) elongated the cables but they soon resumed their former profile.



Line Material Industries' short circuit Lab features a closed circuit TV Monitor panel to observe testing. It has the most modern metering equipment, and the world's highest speed, 60-cycle generator for short circuit testing. This can deliver over 500,000 KVA of electrical energy momentarily. A 1,500,000 KVA air blast breaker can interrupt 80,000 amperes after any pre-set current flow.

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GE Method Improves Feed Pump Motor Construction

These two pre-engineered molded rings provide uniform, simpler, stronger windings form GE's big boiler feed pump motors. The larger ring contains entrance cables and distribution leads for series connection of motor coils while the smaller ring contains phase unbalance equalizing connections.

Added mechanical strength to the whole turn end assembly on large induction motors and uniformity of quality are the result of a new method of manufacture introduced by the General Electric Co.

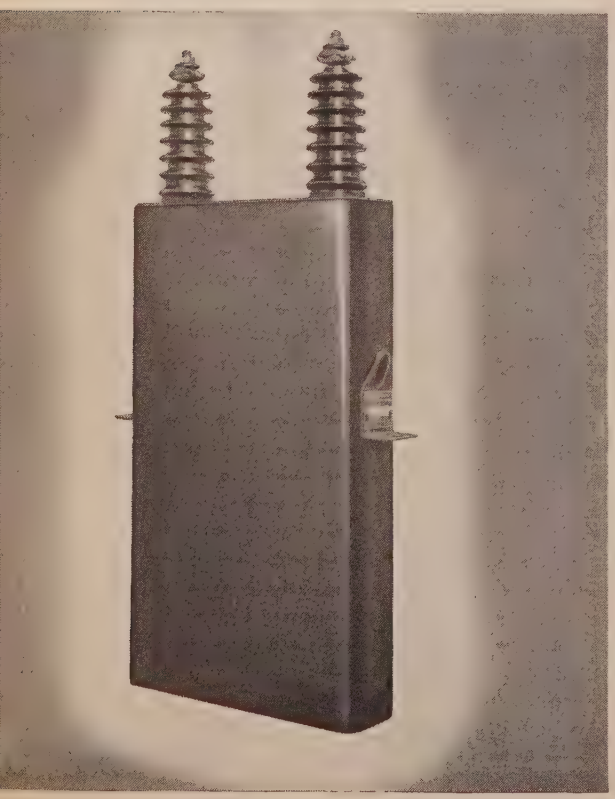
Instead of a hand-tied bundle of conductors and leads, with possible variations in quality of assembly, coil connections on GE's boiler feed pump motors are pre-engineered in molded harnesses of supported epoxy resin. Short leads emerge from one harness at the precise points for making the series connections among the various coils. Entrance cable connections are included in the ring and do not have to be made by hand during the motor assembly.

The second harness of similar construction contains connections for equalizing phase unbalances and suppressing harmonics.

The pre-engineered harness system provides simpler and more reliable connections, uniform for all machines of a given type and rating.

Completely insulated conductors in each ring are molded in a supported epoxy resin.

G-E "COMPACT ISOKRAFT 50" CAPACITORS OFFER*



900 KVARS AT

General Electric's new "COMPACT ISOKRAFT 50" capacitor represents the lightest and most compact 50-kvar unit available. And because of these benefits, higher rated, lighter capacitor equipments can be installed in locations where weight and size are limiting factors.

Single-row capacitor equipments offer the cumulative weight reduction of these new, 4-inch-thick, 82-pound, 50-kvar units. They weigh less and, installed, have less extension beyond the pole. Easier, less expensive installation and improved appearance on the pole result.

"COMPACT ISOKRAFT 50" capacitors help make available a 900-kvar single-row equipment that weighs less than the first 600-kvar equipment introduced in 1956. And the 900 kvars fit into an

*Trademark of General Electric Co.

CEI Ups Besse

Ralph M. Besse has been elected president of the Cleveland Electric Illuminating Co., succeeding Elmer L. Lindseth, who was elected chairman.

Mr. Lindseth, who headed the Ohio company for 15 years, will continue as the company's chief executive.

Mr. Besse was formerly executive vice president and continues as the chief operating executive. He has been with the utility since 1948.

MEN OF POWER

McClanahan To Head Middle West Service Co.

Rodman McClanahan has been elected president of Middle West Service Co., business and engineering consultants. He succeeds Jay Samuel Hartt, who was elected chairman of the board of directors.

Mr. McClanahan had been executive vice president for seven years.

At the same time, George Frank and Elmer Gates were elected vice presidents.

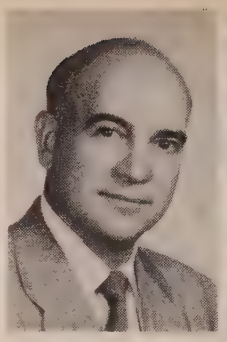
Mr. McClanahan was elected executive vice president in 1953. He was first elected a vice president in 1948, after 18 years service with the company. Previous to joining Middle West, he was a vice president of United Public Utilities Co.

Mr. Frank has been a vice president and director of Emerson Consultants, Inc., and brings to Middle West over 20 years experience in methods planning, work study, and

Rodman McClanahan

improvement, cost control, production control, fabrication, and assembly. He will head a new industrial department.

Mr. Gates, former manager of the rate department, has been with the company since 1951. He has more than 20 years experience in utility rate work, including six years as utility engineer on the staff of the California Public Utilities Commission.



Gates

Frank

Toalson Named President of A. B. Chance Co.

Nathan A. Toalson has been elected president of the A. B. Chance Co. He succeeded F. Gano Chance, who continues as senior officer, chairman of the board, and chairman of the executive committee. Mr. Toalson has been executive vice president of the power and communication equipment manufacturing firm since 1956.

Mr. Chance also announced that L. C. Hansen, former vice president of marketing, has been appointed vice president and general manager of the Chance division, largest of the company's three divisions. Mr.

Hansen will direct marketing, manufacturing, and engineering functions of the company's operations in Centralia, Mo., Pittsburgh, San Francisco, and Parkersburg, W. Va.

Olson President of KCP&L

Robert A. Olson, former vice president and secretary of the Kansas City Power and Light Co., has been elected president of the utility. Harry B. Munsell, president since 1947, was named chairman of the board.

Mr. Olson joined the company as secretary early in 1947, after 12 years of legal and financial work with The United Light and Railway Co., a utility holding company with headquarters in Chicago.

He was named secretary-treasurer in 1949, vice president and treasurer in 1955, and vice president and secretary in 1957. He has served as a director of the utility since 1950.

NEGA Elects Abbott

The election of Charles T. Abbott as vice president, operations, of the New England Gas and Electric Association Service Corporation, has been announced by President Hall M. Henry.

Mr. Abbott has been a director of the corporation since 1958. He first joined the organization in 1930 and was subsequently appointed electrical engineer in 1940. He was named chief electrical engineer in 1956. He is currently chairman of the engineering and operations division of the Electric Council of New England.

Sierra Pacific Elects VP's

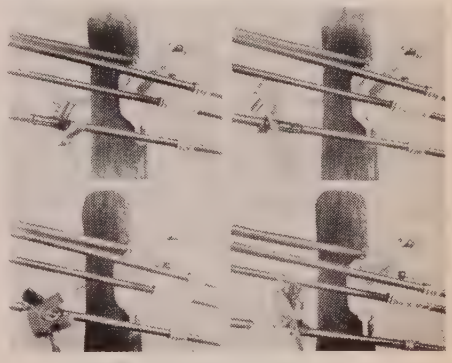
Sierra Pacific Power Co. has announced the election of Fred L. Fletcher as executive vice president. At the same time three department heads were also named vice presidents.

The three new vice presidents are: Roy Torvinen, treasurer; Neil W. Plath, general superintendent; and Merle H. Atcheson, chief engineer.

NEW PRODUCT DESIGN

Tool Speeds Stripping of Polyethylene Insulation

Hendrix Wire and Cable Corp. has developed a tool to strip thermoplastic insulation from power transmission cable. Whereas a lineman in the past often worked 15 minutes to strip a 4-in. section of high-density polyethylene insulation from a power cable, he can now utilize the tool to strip hot-line cable in less than five minutes. The tool will remove 20/64 in. of insulation from conductor sizes No. 6 to 750,000 CM. The tool also reduces time and effort required to strip rubber and other thermoplastic insulation. In use, the tool is heated almost to red hot, then fitted on a hot-line pole. A modified V-blade enables the lineman to make a clean



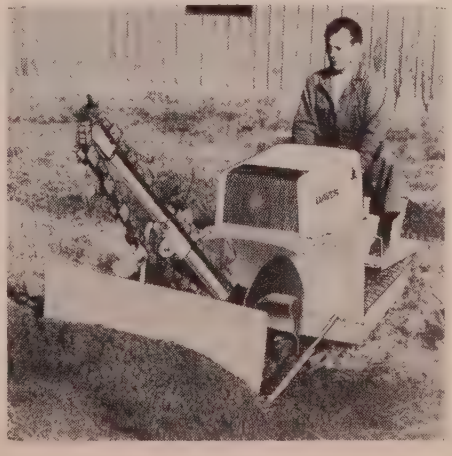
circular cut through the insulation to the cable at each end of the section to be stripped out. Other blades make linear cut, and a claw bar on the tool snaps the insulation away.

Circle item #25 on reply card

Backfill Trencher

Equipped with its own back-fill blade, the **Davis** T-66 is proving to be a fast trencher that handles its own backfilling assignments. Machine is tracked for positive traction and trenching speed control. Depth of trench is 30 to 66 in., with width of cut up to 12 in. Backfill blade is hydraulically operated. Unit has independent drive clutches and disk steering brakes for each track.

Circle item #26 on reply card



Pole Inspection Kit

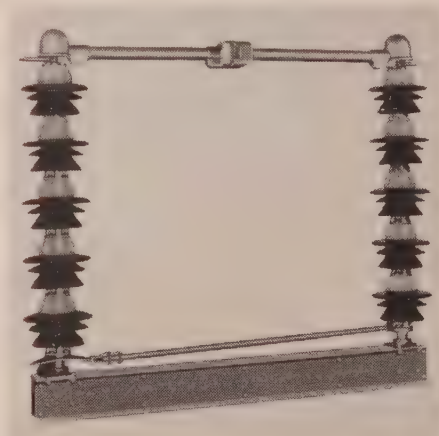
Containing all accessory items necessary for ground-line inspection of utility poles, a kit by **Chapman Chemical Co.** is useful for all types of wood pole inspections. Included in a metal tote-box are: 200 treated wood plugs, hammer, head hatchet, stapling gun and staples, 8-in. increment borer, 8-ft steel tape, wire brushes, 10-in. mortar trowel, waterless hand cleaner, wiping cloth and 200 Pol-Nu aluminum dating tags with nails.

Circle item #27 on reply card

230-kv Air Switch

Southern States Equipment Corp. is now supplying its type WT center side-break air switch with a voltage rating of 230 kv and a continuous rating of 1200 amps. Unit has smooth, well rounded contours to suppress corona. Amplitact contacts provide maximum security under high short circuit conditions. WT is also ice and corrosion resistant and is available in ratings as low as 34.5 kv, 600 or 1200 amps.

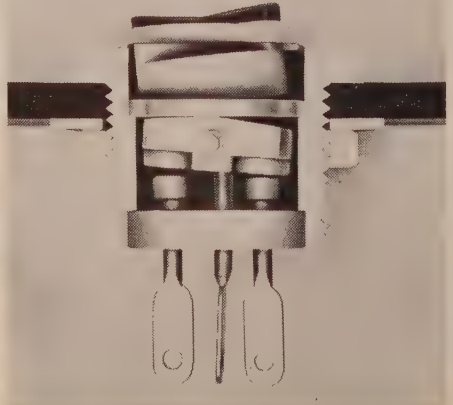
Circle item #28 on reply card

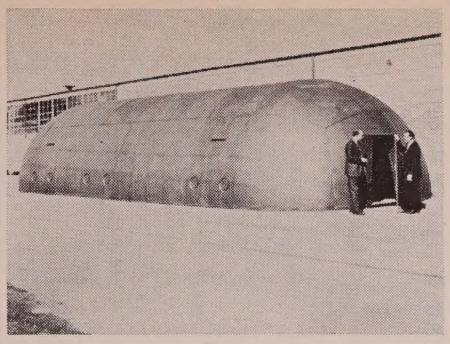


Magnetic Circuit Micro-Switch

Hermetically sealed FluxLink switch by **Space Components, Inc.** is actuated by a permanent magnet circuit and will operate reliably and safely under all adverse conditions, underwater or in explosive or corrosive atmospheres. Current capacities are 0-15 amps, 125 v. a-c. Switch is micro-miniature and long lived since it has only one moving part. Switch has no springs or other normal mechanical linkage.

Circle item #29 on reply card

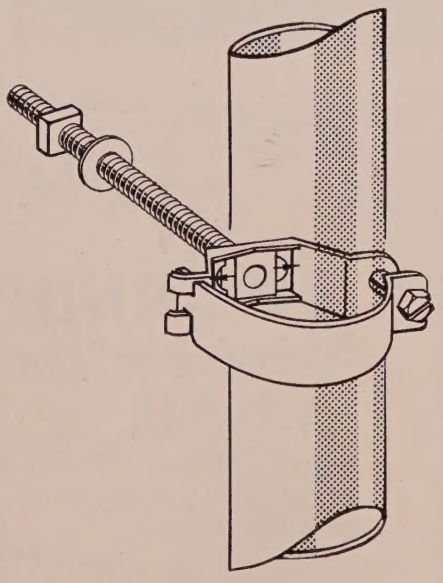




Fiberglass Shelter

Specialty Electronics Development Corp.'s 50-ft transportable, easily assembled, molded, fiberglass shelter is believed to be the biggest of its kind ever produced. Interchangeable, cam locking sections can be erected in one hour by four men, and can be dismantled in 10 minutes. Structure is weathertight, lightproof, insulated for heat and humidity. Available in lengths from 20 feet.

Circle item #30 on reply card



Entrance Mast Anchor

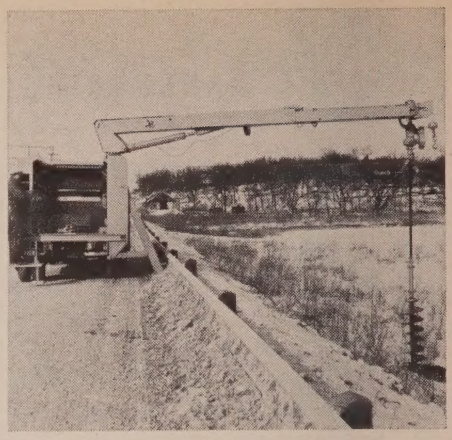
Adjusto-clamp, introduced on the market by **Porcelain Products Co.** is designed for use in anchoring service entrance masts to sides of structures. Possessing "sideways adjustability" which allows straightening the mast after installation or aligning mast with meter socket even when the bolt hole is drilled a bit off vertical, Adjusto-clamps are standard in all 2085 Porcelain Products Mast Kits and are available separately for 2 or 2½ in. pipe.

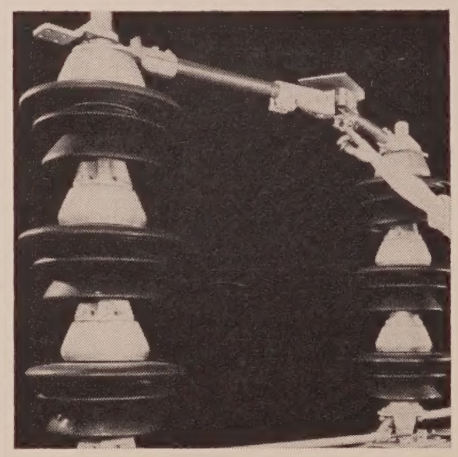
Circle item #31 on reply card

Disconnect Switch

A rotating-insulator, center side-break disconnecting switch featuring braidless terminal hinge contacts for longer life and only two insulator stacks per pole has been announced by **General Electric.** Designated the RJ-2, the switch is available in ratings from 69 kv heavy duty through 230 kv, for currents from 600 through 2000 amps. The RJ-2 may be mounted horizontally, vertically, or underhung.

Circle item #32 on reply card





All-Purpose Equipment

Pitman Polecat is a three-way unit which functions as digger, derrick, and aerial personnel bucket. Boom rotates full 360 degrees and digs holes in a circle from 24 to 40 ft in diameter without moving the truck. As a hydraulic derrick it will extend under full load of 8,000 lbs to a 32 ft height. Unit will fit onto body of most standard, heavy-duty line trucks. Has quick, easy operation.

Circle item #33 on reply card

A-C Contactor

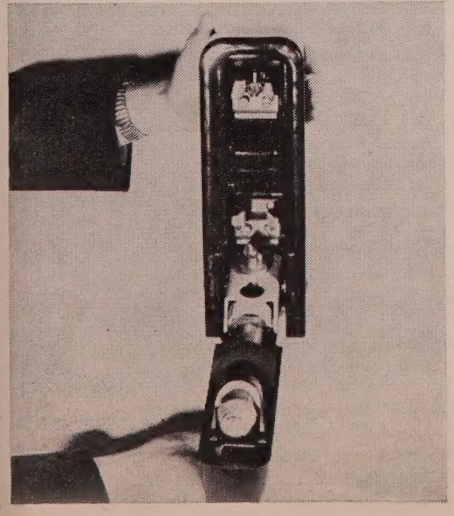
A 600-amp a-c contactor (Type GP) has been developed by **Westinghouse.** The contactor has an a-c operating magnet and is insulated for a maximum of 600 volts. Designed for continuous duty, the a-c coils operate the contactor at 85 to 110 per cent of rated coil voltage. Featuring small size, the unit can be mounted on steel and is available in two- or three-pole, front- or rear-connected assemblies, with or without arc quenchers.

Circle item #34 on reply card

Extra-Heavy-Duty Cutout

An extra-heavy-duty cutout (Type EUH) has been added to the line of distribution cutouts manufactured by **Westinghouse.** It is applicable in a single, universal box to systems up to 7.8 kv with interrupting ratings up to 14,000 amps, RMS asymmetrical. Fuse tube has glass epoxy outer shell that provides strength to contain the high arc energy and will accommodate fuse links up to 100 amps.

Circle item #35 on reply card



CALENDAR OF EVENTS

June 19-24—American Institute of Electrical Engineers, Summer General Meeting, Chalfont-Madden Hall, Atlantic City, N. J.

July 24-August 5—Columbia University, Ninth Annual Utility Management Workshop, Arden House, Harriman Campus, Harriman, N. Y.

August 9-12—American Institute of Electrical Engineers, Pacific General Meeting, El Cortez Hotel, San Diego, Calif.

September 7-9—Northwest Electric Light and Power Association, Annual Convention, Glacier Park Lodge, Glacier National Park, Mont.

September 7-9 — American Society of Mechanical Engineers, Joint Automatic Control Conference, Massachusetts Institute of Technology, Cambridge, Mass.

September 15-16—American Society of Mechanical Engineers, Engineering Management Conference, Morrison Hotel, Chicago, Ill.

September 26-30 — Instrument Society of America, Fall Instrument-Automation Conference and 15th Annual Meeting, New York Coliseum, New York, N. Y.

September 28-30—Indiana Electric Association, 51st Annual Convention, French Lick-Sheraton Hotel, French Lick, Ind.

September 29-30—Electric Companies Public Information Program, 1960 PIP Workshop Conference, Sheraton-Charles Hotel, New Orleans, La.

September 29-30—Southeastern Electric Exchange, Accounting Conference, Tides Hotel, St. Petersburg, Fla.

October 5-7—Wisconsin Utilities Association, Electric and Gas Sales and Operating Sections Convention, Schroeder Hotel, Milwaukee, Wisc.

October 9-14—American Institute of Electrical Engineers, Fall General Meeting, Morrison Hotel, Chicago, Ill.

October 20-22—Electric Companies Public Information Program, Second National Youth Conference on the Atom, Musuem of Science and Industry, Chicago, Ill.

November 9-11—American Institute of Electrical Engineers, Second Power Industry Computer Application Conference, Chase Hotel, St. Louis, Mo.

INDEX TO ADVERTISERS AND THEIR AGENCIES